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Regulations and Non-Regulatory Revisions to State Implementation Plan: Michigan

Atlantic Environmental Associates, Inc.
Waltham, MA

Prepared for

Environmental Protection Agency
Research Triangle Park, NC

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Regulations and Non-Regulatory Revisions to State Implementation Plan: Michigan

By

Atlantic Environmental Associates, Inc.
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Contract No. 68-02-3565

EPA Project Officer: Willis P. Beal

Prepared for

U.S ENVIRONMENTAL PROTECTION AGENCY
Control Programs Development Division
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

July 1981

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PREFACE

This document has been produced in compliance with Section 110(h) of the Clean Air Act, as amended in 1977, which mandates periodic publication of State Implementation Plan (SIP) requirements. The first section of the document comprises the Federally approved SIP regulations. It consists of the EPA approved State and/or local air pollution control regulations cited by reference in the Federal Register; all regulations Federally promulgated as of August 1, 1981 have been included.

The present compilation constitutes an update of a previous documentation of regulations as of July 1, 1979.* State and/or local air quality regulations which have not been Federally approved as of August 1, 1981 are not included. However, any omissions of regulations from this document in no way affects the ability of the respective Federal, State or local agencies to enforce such regulations.

This document is not intended to provide a tool for determining the enforceability of any given regulation. Rather, it is intended to provide a comprehensive compilation of those regulations which are incorporated by reference into Title 40, Part 52, of the Code of Federal Regulations (CFR). The exclusion of a Federally approved regulation from this document does not diminish the enforceability of the regulation. Similarly, the inclusion of a given regulation in this document does not, in itself, render the regulation enforceable by either the State or EPA.

The regulations have been organized in this document according to the official State/local agency format. However, since State air quality regulations vary widely in their organization, content, and language, a standardized subject index has been added. The index listings consist of both pollutant and activity oriented categories to facilitate usage. For example, regulations which apply to copper smelters may be found under sulfur compounds (50.2), particulate matter process weight (50.1.1), or copper smelters (51.15). Federal regulations pertaining to a given State are not included herein but can be found under Title 40 Code of Federal Regulations, Part 52.

Additionally, a summary sheet of the regulatory revisions is included to provide a quick historical assessment of the changes. These summary sheets contain the date of submittal to EPA of each revision and the Federal Register publication date on which the revision was approved by EPA. A brief description of the regulation which was submitted is also included.

In accordance with the Act, the second part of the document contains non-regulatory SIP revisions approved by EPA up to August 1, 1981. All approved non-regulatory revisions listed under Identification of Plan in the CFR are included except notices or certifications of public hearings, and technical support data. Non-regulatory submittals which have only received EPA approval on selected elements are included in their entirety with an accompanying indication of the status of Federal actions on the non-approved elements. The non-regulatory revisions have been organized in this document according to the date of publication of EPA approval in the Federal Register. For historical completeness, a complete tabulation of these revisions is provided at the beginning of this second section.

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* Regulations and Non-Regulatory Revisions to State Implementation Plan: Michigan, EPA-450/2-80-029, prepared under Contract 68-02-3388, July 31, 1980.

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16. ABSTRACT

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The second part of the document contains the text of non-regulatory SIP revisions approved by EPA up to August 1, 1981, excluding notices or certifications of public hearings and technical support data. A complete tabulation of these revisions is also provided.

17. KEY WORDS AND DOCUMENT ANALYSIS

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SUMMARY OF
EPA-APPROVED REGULATORY REVISIONS TO STATE OF MICHIGAN SIP
BETWEEN JULY 1, 1979 AND JULY 31, 1981

Publication of Approval	Submittal Date	Page	Document Description
05/06/80	04/25/79 01/09/80	45FR29801	Adopted rules of commission effective on 01/18/80. Adopted rules identical to rules submitted on 04/25/79, except for a modification in the numbering system. Regulations concerning iron and steel sources were not acted upon.
05/22/81		46FR27931	Regulations concerning iron and steel sources were acted upon. Portions of R 336.1331 Table 31, item c were disapproved. No action was taken on Parts 5, 7, 11, 13, 16, and 17.

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PART 1. GENERAL PROVISIONS

R 336.1101. Definitions; A.

Rule 101. As used in these rules:

(a) "Act" means Act No. 348 of the Public Acts of 1965, as amended, being §336.11 et seq. of the Michigan Compiled Laws.

(b) "Air-cleaning device" means any method, process, or equipment that renders less noxious, removes, or reduces air contaminants discharged into the atmosphere.

(c) "Air contaminant" means a dust, fume, gas, mist, odor, smoke, vapor, or any combination thereof.

(d) "Air pollution" means the presence in the outdoor atmosphere of air contaminants in quantities, with characteristics, under conditions and circumstances, and of a duration which are or can become injurious to human health or welfare, to animal life, to plant life, or to property, or which interfere with the enjoyment of life and property in this state. However, "air pollution" excludes all aspects of employer-employee relationships as to health and safety hazards. With respect to any mode of transportation, nothing in this act or in these rules shall be inconsistent with the federal regulations, emission limits, standards, or requirements on various modes of transportation. Air pollution shall not be construed to mean those usual and ordinary animal odors associated with agricultural pursuits and located in a zoned agricultural area if the numbers of animals and methods of operation are in keeping with normal and traditional animal husbandry practices for the area.

(e) "Air quality standard" means the concentration and duration of an air contaminant specified by the commission or by the national ambient air quality standards as contained in 40 C.F.R. part 50 prior to November 1, 1978, whichever is more restrictive, as the maximum acceptable concentration and duration of that contaminant in the ambient air.

(f) "Allowed emissions" means the level of emission of an air contaminant that is authorized by a rule, a permit condition, or a commission order. Where such rule, permit condition, or commission order specifies a time schedule for reducing emissions, the most restrictive emission limit specified shall be used to determine allowed emissions.

(g) "Alternative method", with respect to source sampling, means a method or set of procedures for obtaining source samples which is not a reference test method or an equivalent method and which has been demonstrated to the commission's satisfaction to, in specific cases, produce results adequate for a performance test.

(h) "Ambient air" means that part of the atmosphere, outside of buildings, to which the general public has access.

(i) "ASTM" means the American society for testing and materials.

(j) "Automobile" means any passenger motor vehicle capable of seating 12 or fewer occupants.

R 336.1103. Definitions; C.

Rule 103. As used in these rules:

(a) "Capacity factor" means the ratio of the average load on a machine or equipment for the period of time considered to the capacity rating of the machine or equipment.

(b) "Charging period", with respect to coke ovens utilizing larry car charging methodology, means the total time taken from the time at which the lids are removed from the oven before charging to the time at which the leveling door and the charging holes are closed with their respective lids after the coal from the larry car hoppers is emptied into the oven being charged through the respective charging holes and the coal has been leveled in the oven. "Charging period", with respect to coke ovens utilizing pipeline charging methodology, means the total time taken from the time at which the coal starts flowing into an oven by opening the preheated coal inlet valve to the time at which the coal flow ends when the inlet valve is always closed.

(c) "Coating line" means 1 or more apparatus or operations comprised of all applicators, flash-off areas, and ovens wherein a surface coating is applied to a material and dried or cured to a finished product.

(d) "Coating of automobiles and light-duty trucks" means the coating of all metallic components, including, but not limited to, main body parts, frames, small parts, and wheels during assembly of such vehicle.

(e) "Coating of cans" means exterior coating and interior spray coating in 2-piece can lines; interior and exterior coating in sheet coating lines for 3-piece cans; side seam spray coating and interior spray coating in can fabricating lines for 3-piece cans; and sealing compound application and sheet coating in end coating lines.

(f) "Coating of coils" means the coating of any flat metal sheet or strip that comes in rolls or coils.

(g) "Coating of fabric" means the application of any type of coating to flat sheets of a textile substrate.

(h) "Coating of large appliances" means the coating of the component metal parts, including, but not limited to, doors, cases, lids, panels, and interior support parts of residential and commercial washers, dryers, ranges, refrigerators, freezers, water heaters, dishwashers, trash compactors, air conditioners, and other associated products.

(i) "Coating of metal furniture" means the coating of any furniture made of metal and includes the coating of any metal part that is or shall be assembled with other metal, wood, fabric, plastic, or glass parts to form a furniture piece.

(j) "Coating of paper" means the application of any decorative or functional coating applied to flat sheets of paper or pressure-sensitive tapes regardless of substrate, including paper, fabric, or plastic film; related wet-coating processes on plastic film, including, but not limited to, typewriter ribbons, photographic film and magnetic tape; and decorative coatings on metal foil, including, but not limited to, gift wrapping and packaging. This definition does not include the application of any coating applied to recording papers, including any paper used in thermal printers, electrocardiographs, and similar medical instruments, dielectric printer-plotters, and facsimile recorders.

(k) "Coating of vinyl" means any printing, decorative coating, or protective topcoat applied over vinyl-coated fabric or vinyl sheets.

(l) "Coke battery" means a series of coke ovens arranged side by side with an integral heating system.

(m) "Coke oven" means a chamber in which coal is destructively distilled to yield coke.

(n) "Cokeside", with respect to a coke oven, means that side of the coke oven through which coke is discharged.

(o) "Coking cycle" means the time during which coal undergoes destructive distillation in a coke oven. It commences at the end of the charging period and ends at the beginning of the pushing operation, but does not include any decarbonization periods.

(p) "Cold cleaner" means a tank containing organic solvent at a temperature below its boiling point which is used to spray, brush, flush, or immerse a metallic object for the purpose of cleaning or degreasing.

(q) "Commercial location" means a publicly or privately owned place where persons are engaged in the exchange or sale of goods or services and multiple housing units designed for 3 or more families, except for elementary and secondary schools and facilities owned and operated by the state government. A separate building or group of buildings used for the exchange or sale of goods or services and having a single owner and manager constitutes a separate commercial location.

(r) "Control equipment" means an air-cleaning device.

(s) "Conveyorized cold cleaner" means any continuous system that transports metallic objects through a bath containing organic solvent at a temperature below its boiling point for the purpose of cleaning or degreasing.

(t) "Conveyorized vapor degreaser" means any continuous system that transports metallic objects through or over, or through and over, a bath containing organic solvent which is heated to its boiling point for the purpose of cleaning or degreasing.

(u) "Cutback paving asphalt" means asphalt cement that has been liquefied by blending with a volatile organic compound and is used for the purpose of paving or repairing, or paving and repairing, a road surface.

(v) "Cycle of operation", with respect to continuous emission monitoring systems, means the total time a monitoring system requires to sample, analyze, and record an emission measurement.

R 336.1104. Definitions; D.

Rule 104. As used in these rules:

(a) "Dampered-off coke oven" means a coke oven that is isolated from the coke oven gas collector main by closing every damper valve on all standpipes of that oven during the decarbonization period.

(b) "Decarbonization period", with respect to coke ovens, means the time for combusting carbon formed at the oven roof and in the standpipe assembly. The decarbonization period commences when a charging-hole lid or lids or a standpipe lid or lids are removed or opened near the end of the coking cycle and ends with the initiation of the next charging period.

(c) "Delivery vessel" means any tank truck, tank-equipped trailer, railroad tank car, or any similar vessel equipped with a storage tank used for the transport of a volatile organic compound from sources of supply to any stationary vessel.

(d) "Dispensing facility" means a location where gasoline is transferred to a motor vehicle tank from a stationary vessel.

R 336.1105. Definitions; E.

Rule 105. As used in these rules:

(a) "Equivalent method", with respect to source sampling, means a method or set of procedures for obtaining source samples which has been demonstrated to the commission's satisfaction to have a consistent and quantitatively known relationship to an applicable reference test method.

(b) "Exacerbate an existing violation of an air quality standard", with respect to sulfur dioxide, particulate matter, oxides of nitrogen, or carbon monoxide, means that applicable allowed emissions of a given contaminant will have a predicted ambient air concentration in a nonattainment area for that contaminant which exceeds any of the following concentrations:

	Averaging Time(1)				
Pollutant	Annual	24-hour	8-hour	3-hour	1-hour
Sulfur dioxide	1	5		25	
Particulate matter	1	5			
Oxides of nitrogen	1				
Carbon monoxide			500		2,000

(1) All concentrations are in $\mu g/m^3$.

For purposes of this definition, "applicable allowed emissions" means the sum of allowed emissions of a given contaminant for all equipment installed at a single geographic site pursuant to a permit to install approved after August 7, 1977, and for which offsets have not been provided as a requirement under a prior permit approval.

(c) "Excess air" means any air in excess of the amount of air required for complete combustion of a material as determined by using reference test method 3.

(d) "Excess emissions" means emissions of an air contaminant in excess of an emission standard.

R 336.1106. Definitions; F.

Rule 106. As used in these rules:

(a) "Federal land manager" means, with respect to any lands in the United States, the secretary of the department with authority over such lands.

(b) "Fossil fuel-fired steam generator" means a furnace or boiler used in the process of burning fossil fuel for the primary purpose of producing steam by heat transfer.

(c) "Fuel-burning equipment" means a device, contrivance, or equipment used principally, but not exclusively, for the burning of fuel, and all appurtenances thereto, including ducts, breechings, control equipment, fuel-feeding equipment, ash removal equipment, combustion controls, and stacks and chimneys, which equipment is used for indirect heating in which the material being heated is not contacted by, and does not add substance to, the products of combustion. This equipment typically includes that used for heating water to boiling; raising steam or superheating steam; heating air as in a warm-air furnace; furnishing process heat that is conducted through vessel walls; and furnishing process heat indirectly through its transfer by fluids.

(d) "Fuel gas system" means any system in which gas is generated by a petroleum refinery process unit and which is combusted, including any gaseous mixture of natural gas with such gas, and is not commercially sold.

R 336.1107. Definitions; G.

Rule 107. As used in these rules:

(a) "Gasoline" means any petroleum distillate having a reid vapor pressure equal to or greater than 4.0 psia and used for automotive fuel.

(b) "Geographical site" means contiguous land ownership by 1 landowner. A public right of way, such as a road, railroad, and water course through part of the site is not considered to break the continuity. Where transmission and fuel delivery rights-of-way or a strip of land that serves no other principal purpose than as a transportation or materials handling link connects 2 or more otherwise separate geographical sites, the connected sites shall be considered separate geographical sites.

(c) "Good engineering practice design" means, with respect to stack heights, the height necessary to insure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, and wakes which may be created by the source itself, nearby structures, or nearby terrain obstacles and shall not exceed:

(i) Thirty meters for stacks uninfluenced by structures or terrain.

(ii) The sum of the height of the structure or nearby structure plus 1.5 times the lesser of the height or width of the structure or nearby structure for stacks influenced by structures.

(iii) Such height as an owner or operator of a source demonstrates is necessary through the use of field studies or fluid models after notice and opportunity for public hearing.

R 336.1109. Definitions; I.

Rule 109. As used in these rules:

(a) "Incinerator" means a device specifically designed for the destruction, by burning, of garbage or other combustible refuse or waste material, or both, in which the products of combustion are emitted into the outer air by passing through a stack or chimney.

(b) "Indian governing body" means the governing body of any tribe, band, or group of Indians subject to the jurisdiction of the United States and recognized by the United States as possessing the power of self government.

(c) "Insulation of magnet wire" means the process of coating aluminum or copper electrical wire by application of a nonconductive material, such as varnish or enamel.

R 336.1112. Definitions; L.

Rule 112. As used in these rules:

(a) "Light-duty truck" means any motor vehicle rated at not more than 8,500 pounds gross vehicle weight and designed primarily for the transportation of property, including, but not limited to, pick-ups, vans, and window vans.

(b) "Loading facility" means a location where volatile organic compounds are received from sources of supply and are stored for later delivery to another facility.

(c) "Lowest achievable emission rate" means, for any source, that rate of emission which reflects either of the following:

(i) The most stringent emission limitation that is contained in the implementation plan of any state for such class or category of source, unless the owner or operator of the proposed source demonstrates that such limitations are not achievable.

(ii) The most stringent emission limitation that is achieved in practice by such class or category of source, whichever is more stringent.

The application of this term shall not permit a proposed new or modified source to emit any pollutant in excess of the amount allowable under 40 C.F.R., part 60 or part 61 as promulgated prior to November 1, 1978.

R 336.1113. Definitions; M.

Rule 113. As used in these rules:

(a) "Major offset source", with respect to nonattainment areas, means any new equipment or accumulation of new equipment at a geographical site owned or operated by the same person which has potential emissions of 100 or more tons per year of particulates, sulfur dioxide, oxides of nitrogen, carbon monoxide, or volatile organic compounds. For purposes of this definition, "new equipment" means any process or process equipment for which a permit to install was approved after December 21, 1976. It includes all modifications and all equipment replacements or accumulations of modifications and replacements which have potential emissions of 100 or more tons per year, even if accompanying reductions from the same or other sources lead to a net emission decrease or increase of less than 100 tons per year. It does not include the following:

(i) Parts replacement considered by the commission to be minor.

(ii) Repair or maintenance considered by the commission to be routine for that source category.

(iii) Increase in emissions due to increases in hours of operation, unless limited by permit conditions or commission order.

(iv) Use of alternative fuels or raw materials if the equipment was designed to accommodate such alternative use prior to the effective date of this rule.

(v) Changes in ownership.

(b) "Malfunction" means any failure of an air-cleaning device or process equipment or any failure of a piece of equipment to operate in a normal or usual manner.

(c) "Manufacturing location" means a place where a person is engaged in the making of goods or wares, including the generation of electricity in the processing of material or primarily in the disposal or treatment of solid or liquid waste. For the purpose of assessing a surveillance fee, "manufacturing location" includes all such places, whether publicly or privately owned and contained within 1 geographical site, except places owned and operated by the state government. A power plant, as defined in table 42 of rule 401, constitutes a separate manufacturing location when used to supply steam or energy to more than 1 other manufacturing or commercial location. In any case, a power plant with a capacity of more than 500,000 pounds of steam per hour is considered a separate manufacturing location. For a large industrial complex or other unusual cases, the commission may determine that the complex constitutes more than 1 manufacturing location, based on such factors as separate corporate operating divisions, units, or sections.

(d) "Material handling equipment", as referenced in table 31, means a device, contrivance, or equipment used to bag, blend, convey, crush, grind, load, mill, mix, shed, store, transfer, or unload a physical substance.

(e) "Motor vehicle" means any self-propelled vehicle registered for, or requiring registration for, use on the highway.

R 336.1114. Definitions; N.

Rule 114. As used in these rules:

"Nonattainment area" means an area designated by the commission as not having attained full compliance with all national ambient air quality standards. Such designation shall be pollutant specific and shall not mean that an area is a nonattainment area for any other pollutant unless so specified. The commission shall maintain a list of designated nonattainment areas and shall update such list when air quality monitoring or modeling data warrant.

R 336.1115. Definitions; O.

Rule 115. As used in these rules:

(a) "Opacity" means the degree to which an emission reduces the transmission of light or obscures an observer's view.

(b) "Open burning" means a fire from which the products of combustion are emitted directly into the outer air without passing through a stack or chimney.

(c) "Open top vapor degreaser" means a tank containing organic solvent which is heated to its boiling point for the purpose of cleaning or degreasing metallic objects through the condensation of the hot solvent vapor on the colder object.

(d) "Organic compound" means any compound of carbon or mixture of such compounds, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, boron carbide, silicon carbide, ammonium carbonate, ammonium bicarbonate, methane, and ethane.

(e) "Organic compound-water separator" means any vessel, device, or piece of equipment operated for the recovery of organic compounds from waste water which, in any 1 day, recovers more than 200 gallons of organic compounds from any equipment that processes, refines, stores, or handles such compounds with a reid vapor pressure of more than 0.5 psia.

(f) "Organic solvent" means any volatile organic compound used as a diluent, thinner, dissolver, viscosity reducer, cleaning agent, or for other similar uses.

(g) "Outer air" means air in all space outside of buildings, stacks, or exterior ducts.

R 336.1116. Definitions; P.

Rule 116. As used in these rules:

(a) "Particulate matter" means any air contaminant existing as a finely divided liquid or solid, other than uncombined water, as measured by reference test methods 5A, 5B, or 5C of appendix A to the commission's rules or by an equivalent or alternative method.

(b) "Performance test" means any testing, sampling, extracting, or analysis employing commission-approved methods which is conducted at a source of air contaminant to determine if the source is in compliance with the commission's rules and emission limitations, is in compliance with the conditions of a permit to install or operate, or is emitting an air contaminant that may pose a potential health hazard.

(c) "Permit to install" means a permit issued by the commission authorizing the construction, installation, relocation, or alteration of any process, fuel-burning, refuse-burning, or control equipment in accordance with approved plans and specifications.

(d) "Permit to operate" means a permit issued by the commission authorizing the use of any process, fuel-burning, refuse-burning, or control equipment for the period indicated, after it has been demonstrated that it can be operated in compliance with these rules.

(e) "Person" means an individual person, trustee, court-appointed representative, syndicate, association, partnership, firm, club, company, corporation, business trust, institution, agency, government corporation, municipal corporation, city, county, municipality, district or other political subdivision, department, bureau, agency or instrumentality of federal, state, or local government, or other entity recognized by law as the subject of rights and duties.

(f) "Petroleum" means the crude oil removed from the earth and the oils derived from tar sands, shale, and coal gasification or liquefaction.

(g) "Petroleum refinery" means any facility engaged in producing gasoline, kerosine, distillate fuel oils, residual fuel oils, lubricants, or other products through distillation of pertroleum or through redistillation, cracking, or the reforming of unfinished petroleum derivatives.

(h) "Potential emissions" means those emissions expected to occur without control equipment, unless such control equipment is, aside from air pollution control requirements, vital to production of the normal product of the source or to its normal operation. Annual potential emissions shall be based on the maximum annual-rated capacity of the source, unless the source is subject to enforceable permit conditions or enforceable orders which limit the operating rate or the hours of operation, or both. Enforceable agreements or permit conditions on the type or amount of materials combusted or processed shall be used in determining the potential emission rate of a source.

(i) "PPM" means parts per million, by volume.

(j) "Process" or "process equipment" means any equipment, device, or contrivance, and all appurtenances thereto, for changing any materials or for the storing or handling of any materials, including ducts and stacks, the use of which may cause discharge of an air contaminant into the outer air. "Process" or "process equipment" does not include fuel-burning or refuse-burning equipment.

(k) "Process unit turnaround" means the scheduled shutdown of a refinery process unit for the purpose of inspection or maintenance of such unit.

(l) "Psia" means pounds per square inch absolute.

(m) "Pushing operation", with respect to coke ovens, means the movement of the coke from a coke oven into the coke-receiving car.

(n) "Pushside", with respect to a coke oven, means that side of the coke oven which is adjacent to the pushing machine.

R 336.1118. Definitions; R.

Rule 118. As used in these rules:

(a) "Reference test method", with respect to source sampling, means a method or set of procedures, as described in appendix A to the commission's rules, for obtaining source samples.

(b) "Reid vapor pressure" means the absolute vapor pressure of an organic compound at 100 degrees Fahrenheit as measured by the standard test method set forth in ASTM D-323 or approved equivalent. ASTM D-323 is herein adopted by reference. A copy may be inspected at the Lansing office of the air quality division of the department of natural resources. A copy may be obtained from the Department of Natural Resources, P.O. Box 30028, Lansing, Michigan 48909, at a cost of $4.00. A copy may also be obtained from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103, at a cost of $4.00.

R 336.1119. Definitions; S.

Rule 119. As used in these rules:

(a) "Shutdown" means the cessation of operation of a source for any purpose.

(b) "Smoke" means small gas and airborne particles consisting essentially of carbonaceous material in sufficient numbers to be observable.

(c) "Source sample" means any captured, retained, or collected portion of any raw material, fuel product, by-product, waste material, exhaust gas, air contaminant, or other such material existing as a gas, liquid, or solid, involved with, or resulting from, the operation of a source.

(d) "Sour condensate" means a condensate that emits sour gas at atmospheric pressure.

(e) "Sour crude" means a crude oil that emits sour gas at atmospheric pressure.

(f) "Sour gas" means any gas containing more than 1 grain of hydrogen sulfide or more than 10 grains of total sulfur per 100 standard cubic feet.

(g) "Stack" or "chimney" means a flue, conduit, or duct arranged to conduct an effluent to the outer air.

(h) "Standard conditions" means a gas temperature of 70 degrees Fahrenheit and a gas pressure of 29.92 inches of mercury absolute.

(i) "Standpipe assembly", with respect to coke ovens, means the riser, standpipe lid, and the gooseneck.

(j) "Standpipe assembly emission point", with respect to a coke oven battery equipped with a single collector main or a double collector main, means the flexible connection between the battery top and the base of the riser, the seating surface of the standpipe lid, and the flexible connection between the collector main and the gooseneck. With respect to a battery equipped with a charging main and a gas-offtake main in tandem, "standpipe assembly emission point" means the top main flexible connection, the seating surface of the top riser lid, the top sand seal, the bottom main flexible connection, the seating surface of the bottom riser lid, the bottom sand seal, and the base flexible connection.

(k) "Start-up" means the setting in operation of a source for any purpose.

(l) "Stationary vessel" means any tank, reservoir, or container used for the storage of any volatile organic compound which is not used to transport such volatile organic compound and in which no manufacturing process or part thereof takes place.

(m) "Submerged fill pipe" means any fill pipe that has its discharge opening entirely submerged when the liquid level is 6 inches above the bottom of the vessel or, when applied to a vessel that is loaded from the side, means either of the following:

(i) Any fill pipe that has its discharge opening entirely submerged when the liquid level is 18 inches above the bottom of the vessel.

(ii) Any fill pipe that has its discharge opening entirely submerged when the liquid level is twice the diameter of the fill pipe above the bottom of the vessel, but in no case shall the top of such submerged fill pipe be more than 36 inches above the bottom of the vessel.

(n) "Sulfuric acid plant" means any facility producing sulfuric acid by the contact process by burning elemental sulfur, alkylation acid, hydrogen sulfide, or acid sludge, but does not include facilities where conversion to sulfuric acid is utilized primarily as a means of preventing emissions to the atmosphere of sulfur dioxide or other sulfur compounds.

(o) "Surface coating" means any paint, lacquer, varnish, ink, adhesive, or similar coating material applied on a surface.

(p) "Sweet condensate" means any condensate that is not a sour condensate.

(q) "Sweet crude" means any crude oil that is not a sour crude.

(r) "Sweetening facility" means a facility or process that removes hydrogen sulfide or sulfur-containing compounds, or both, from a sour gas-, sour crude oil-, or sour condensate-stream and converts it to sweet gas, sweet crude, or sweet condensate. The term "sweetening facility" does not include a facility or process that operates in an enclosed system and does not emit hydrogen sulfide to the outer air.

(s) "Sweet gas" means any gas that is not a sour gas.

R 336.1120. Definitions; T.

Rule 120. As used in these rules:

"True vapor pressure" means the equilibrium partial pressure exerted by a liquid or the sum of partial pressures exerted by a mixture of liquids as determined in accordance with methods described in American petroleum institute bulletin 2517, evaporation loss from floating-roof tanks, 1962. American petroleum institute bulletin 2517 is herein adopted by reference. A copy may be inspected at the Lansing office of the air quality division of the department of natural resources. A copy may be obtained from the Department of Natural Resources, P.O. Box 30028, Lansing, Michigan 48909, at a cost of $3.00. A copy may also be obtained from the American Petroleum Institute, 2101 L Street Northwest, Washington, D.C. 20037, at a cost of $3.00.

R 336.1122. Definitions; V.

Rule 122. As used in these rules:

(a) "Vacuum-producing system" means any device that creates a pressure below atmospheric, such as a pump or steam ejector with condenser, including hot wells and accumulators.

(b) "Visible emission" means any emissions that are visually detectable without the aid of instruments.

(c) "Volatile organic compound" means any compound of carbon or mixture of such compounds, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, boron carbide, silicon carbide, ammonium carbonate, ammonium bicarbonate, methane, and ethane, that has a vapor pressure of more than 0.1 millimeters of mercury at standard conditions.

R 336.1127. Terms defined in the act.

Rule 127. Terms defined in the act have the same meaning when used in these rules.

R 336.1128. Recission.

Rule 128. R 336.11 to R 336.79, R 336.101 to R 336.116, and R 336.141 to R 336.147 of the Michigan Administrative Code, appearing on pages 4191 to 4200 of the 1967 Annual Supplement to the Code, pages 6147 to 6149 of the 1972 Annual Supplement to the Code, pages 6654 to 6657 and 6660 to 6662 of the 1973 Annual Supplement to the Code, pages 7249 to 7252 of the 1974 Annual Supplement to the Code, pages 7924 and 7925 of the 1975 Annual Supplement to the Code, and pages 76 to 79 of Quarterly Supplement No. 94 to the Code, are rescinded.

PART 2. AIR USE APPROVAL

R 336.1201. Permits to install.

Rule 201. (1) A person shall not install, construct, reconstruct, relocate, or alter any process, fuel-burning, or refuse-burning equipment, or control equipment pertaining thereto, which may be a source of an air contaminant, until a permit is issued by the commission. This shall be known as a permit to install and shall cover construction, reconstruction, relocation, and alteration of equipment where such is involved. A person planning to install, construct, reconstruct, relocate, or alter any such equipment shall apply to the commission for a permit to install and shall provide the information required in rule 203.

(2) If the proposed equipment is of such magnitude that some phases of construction such as site clearing, foundations, and associated structures have to commence before issuance of the permit to install, the person applying for the permit to install may apply to the commission for approval of the location of the proposed equipment. The commission shall act on such application within a reasonable time and shall not approve the proposed location unless it is reasonably convinced that the equipment, when completed, shall be in compliance with the commission's rules and state law. Construction shall not commence without approval of the location.

(3) An application for a permit to install may be approved subject to any condition, specified in writing, that is reasonably necessary to assure compliance with these rules.

(4) After issuance of the permit to install, trial operation of the equipment is permitted until the commission acts upon the permit to operate.

(5) If the installation, reconstruction, relocation, or alteration of the equipment, for which a permit has been issued, has not commenced within, or has been interrupted for, 18 months, then the permit to install shall become void unless otherwise authorized by the commission as a condition of the permit to install. "Commenced" means undertaking a continuous program of on-site fabrication, installation, erection, or modification, or having entered into binding agreements or contractual obligations, which cannot be cancelled or modified without substantial loss to the owner or operator, to undertake a program of construction of the facility to be completed within a reasonable time.

(6) If a permit to install has not been requested within 3 years of the date of approval of the location pursuant to subrule (2), the location shall become void unless otherwise authorized by the commission as a condition of the location approval.

R 336.1202. Waivers of approval.

Rule 202. If the requirement for approval of a permit to install prior to construction will create an undue hardship to the applicant, the applicant may request a waiver to proceed with construction from the commission. The application for a waiver shall be in writing, shall explain the circumstances that will cause the undue hardship, and shall be signed by the owner or his authorized agent. The application shall be acted upon by the commission within 30 days. If a waiver is granted, the applicant shall submit pertinent plans and specifications for approval as soon as is reasonably practical. The applicant, after a waiver is granted, shall proceed with the construction at his own risk; however, no operation shall be authorized until the application for a permit to install has been approved by the commission. After construction, modification, relocation, or installation has begun or been completed, if the plans, specifications, and completed installations do not meet commission approval, the application for a permit to install shall be denied, unless the alterations required to effect approval are made within a reasonable time as specified by the commission.

R 336.1203. Information required.

Rule 203. (1) An application for a permit to install shall include information required by the commission on the application form or by written notice. If considered by the commission to be pertinent to evaluation of the equipment for which a permit is sought, the information shall include, but is not necessarily limited to, the following:

(a) The expected composition of air contaminant stream, both before and after installation of an air-cleaning device, including emission rate, concentration, exhaust gas volume, and exhaust gas temperature.

(b) The expected physical and chemical characteristics of air contaminants.

(c) Details of air pollution control measures and air-cleaning devices, if any, including a description, design parameters, and anticipated performance.

(d) The location and elevation of the emission point and other factors relating to dispersion and diffusion of the contaminant in the outer air; the relation of the emission point to nearby structures and window openings; and other information necessary to appraise the possible effects of the air contaminant.

(e) The method of disposal of wastes resulting from operation of the process equipment or air-cleaning devices.

(f) A plan for reduction of emissions during air pollution alerts, warnings, and emergencies as required by subrule (1) of rule 1307.

(g) Information, in a form prescribed by the commission, that is necessary for the preparation of an environmental impact statement if, in the judgment of the commission, the equipment for which a permit is sought may have a significant effect on the environment.

(h) Data demonstrating the effect of the air contaminant emissions on human health and the environment.

R 336.1204. Authority of agents.

Rule 204. When a person files plans and specifications as the agent of an owner, the owner shall furnish the agent with a letter of authorization for filing of the plans and specifications, and this letter shall be submitted with the plans and specifications.

R 336.1206. Processing of applications for other facilities.

Rule 206. (1) The commission shall notify the applicant in writing of approval, conditional approval, or denial of an application for a permit to install within 60 days after receipt of the application and information required by rule 203. A copy of a permit approval or denial shall be furnished to the appropriate air pollution control authorities.

(2) When delays will cause undue hardship to an applicant or materially handicap his need for proceeding promptly with the proposed installation, modification, or relocation, a request for priority consideration and the justification therefor shall be submitted. When a priority is granted, the application, if practicable, shall be processed within 15 days after receipt of the request for priority.

R 336.1207. Denial of permits to install.

Rule 207. (1) The commission shall deny an application for a permit to install if, in the judgment of the commission, any of the following conditions exist:

(a) The equipment for which the permit is sought will not operate in compliance with the rules of the commission or state law.

(b) Operation of the equipment for which the permit is sought will interfere with the attainment or maintenance of the air quality standard for any air contaminant.

(c) The equipment for which the permit is sought will violate the provisions of the clean air act, as amended, 42 U.S.C. §7401 et seq., and particularly the rules promulgated on and before September 1, 1978, in standards of performance for new stationary sources, 40 C.F.R. §60.1 to §60.275 (July 1, 1978), and national emission standards for hazardous air pollutants, 40 C.F.R. §61.01 to §61.55 (July 1, 1978).

(d) Sufficient information has not been submitted by the applicant to enable the commission to make reasonable judgments as required by subdivisions (a) to (c).

(e) Adequate requested information for preparation of an environmental impact statement is not submitted.

(f) A satisfactory plan for reduction of emissions during air pollution alerts, warnings, and emergencies, as required by rule 203, is not submitted.

(2) When an application is denied, the applicant shall be notified in writing of the reasons therefor. A denial shall be without prejudice to the applicant's right to a hearing before the commission or for filing a further application after revisions are made to meet objections specified as reasons for the denial.

R 336.1208. Permits to operate.

Rule 208. (1) Before the commission issues a permit to operate and except as otherwise provided in subrule (4) of rule 201, a person shall not operate a process, fuel-burning or refuse-burning equipment, or an air-cleaning device pertaining thereto which may be a source of an air contaminant.

(2) Not more than 30 days after completion of the installation, construction, reconstruction, relocation, or alteration of a process, fuel-burning or refuse-burning equipment, or an air-cleaning device pertaining thereto which may be a source of an air contaminant, the owner or his authorized agent of the process or device shall apply in writing to the commission for a permit to operate. Completion of the installation, construction, reconstruction, relocation, or alteration is deemed to occur not later than commencement of a trial operation pursuant to subrule (4) of rule 201.

(3) The commission shall issue the permit to operate equipment if, in the judgment of the commission, all of the following conditions are met:

(a) The equipment operates in compliance with the rules of the commission, the clean air act, as amended, 42 U.S.C. §7401 et seq., and the rules promulgated on and before September 1, 1978, in standards of performance for new stationary sources, 40 C.F.R. §60.1 to §60.275 (July 1, 1978), and national emission standards for hazardous air pollutants, 40 C.F.R. §61.01 to §61.55 (July 1, 1978).

(b) The equipment does not interfere with the attainment or maintenance of the air quality standard for any air contaminant.

(c) The equipment is completed in compliance with the permit to install and conditions attached to the permit to install.

(4) The permit to operate continues in effect as long as the equipment performs in accordance with the conditions upon which the permit is based. The commission, at any time after notice and opportunity for a hearing,

may rescind its permit to operate; and the equipment shall not be operated if evidence indicates that the equipment is not performing in accordance with the conditions upon which the permit is based.

R 336.1220. Construction of sources of volatile organic compounds in ozone nonattainment areas; conditions for approval.

Rule 220. Unless the following conditions are met, the commission shall deny a permit to install for a major offset source of volatile organic compounds proposed for location within an ozone nonattainment area:

(a) The proposed equipment shall comply with the lowest achievable emission rate for volatile organic compounds.

(b) All existing sources in the state owned or controlled by the owner or operator of the proposed source shall be in compliance with all applicable local, state, and federal air quality regulations or shall be in compliance with a consent order or other legally enforceable agreement specifying a schedule and timetable for compliance.

(c) Prior to start-up of the proposed equipment, a reduction (offset) of the total hourly and annual volatile organic compound emissions from existing sources equal to 110% of allowed emissions for the proposed equipment shall be provided. The emission offset for a source locating in Wayne, Oakland, Macomb, St. Clair, Washtenaw, Livingston, and Monroe counties shall be secured from sources in those counties. The emission offset for a source locating in any other ozone nonattainment county may be secured from any ozone nonattainment county in Michigan, except Wayne, Oakland, Macomb, St. Clair, Washtenaw, Livingston, and Monroe counties.

(d) Subdivisions (a) and (c) do not apply if the allowable emission rates for the proposed equipment are less than 50 tons per year, 1,000 pounds per day, and 100 pounds per hour.

R 336.1221. Construction of sources of particulate matter, sulfur dioxide, or carbon monoxide in or near nonattainment areas; conditions for approval.

Rule 221. Unless the following conditions are met, the commission shall deny a permit to install for a major offset source of particulate matter, sulfur dioxide, or carbon monoxide if such source may exacerbate an existing violation of any air quality standard or if such source is proposed for location in a nonattainment area:

(a) The proposed equipment shall comply with the lowest achievable emission rate for the pollutant for which the area is nonattainment.

(b) All existing sources in the state owned or controlled by the owner or operator of the proposed source shall be in compliance with all applicable local, state, and federal air quality regulations or shall be in compliance with a consent order or other legally enforceable agreement specifying a schedule and timetable for compliance.

(c) Prior to start-up of the proposed equipment, an emission reduction (offset) from existing sources in the area of the proposed source shall be provided such that, in the commission's judgment, there is a net air quality benefit and reasonable progress toward attainment of the applicable air quality standard. Such offsets shall be on a time frame compatible with the applicable air quality standard. If the proposed equipment is to be located in an area not meeting the applicable health-related air quality standard, the emission reduction shall be not less than 1.2 to 1. If the proposed equipment is to be located in an area not meeting the welfare-related air quality standard, the emission reduction shall be more than 1 for 1. If the offsetting emissions involve the control of fugitive particulate emissions, the emission reduction shall be not less than 1.5 to 1.

(d) The requirements of subdivision (a) do not apply to particulate, sulfur dioxide, and carbon monoxide emissions if the increased allowable emissions are less than 50 tons per year and 1,000 pounds per day.

(e) The requirements of subdivision (c) do not apply to carbon monoxide emissions.

R 336.1240. Required air quality models.

Rule 240. (1) All air quality modeling demonstrations required by the commission or used to support or amend the state implementation plan shall be made using 1 of the following models:

(a) An applicable model cited in the United States environmental protection agency's "Guideline on Air Quality Models", OAQPS, 1.2-080, April 1978.

(b) An applicable alternate model that meets the requirements of subrule (2).

(c) In cases where a plume is influenced by downwash eddies or wakes that may be caused by the source itself, nearby structures, or nearby terrain obstacles, models described in references 16, 17, and 18 in the United States environmental protection agency's "Guideline on Air Quality Models," OAQPS, 1.2-080, April 1978, may be used.

(2) The commission may approve the use of an alternate model if either of the following conditions is met:

(a) The model has been approved by the United States environmental protection agency pursuant to the review and revision contemplated in the United States environmental protection agency's "Guideline on Air Quality Models," OAQPS, 1.2-080, April 1978.

(b) All of the following conditions are met:

(i) A request for utilization of an alternate model is submitted to the commission.

(ii) The applicant demonstrates that the alternate model is comparable to those required by subrule (1)(a), using methods similar to those outlined in the United States environmental protection agency workbook for the comparison of air quality models, OAQPS, April 1977.

(iii) The applicant demonstrates, by comparison with actual ambient monitor sampling results, that the alternate model predicts ambient concentrations as well as an approved model cited in the guideline referenced in subrule (1)(a).

(iv) The alternate model or its algorithms are sufficiently described and documented to enable the commission to duplicate results.

(v) Output from the alternate model is sufficient to enable comparison with any applicable ambient air quality standard.

(3) The use of an alternate model approved according to the requirements of subrule (2) may be extended for use by others in other instances, if such other usage is appropriate and has been suitably documented in the prior approval.

R 336.1241. Air quality modeling demonstration requirements.

Rule 241. All air quality modeling demonstrations required by the commission or used to support or amend the state implementation plan shall be consistent with all of the following requirements:

(a) A 5-year meteorological data base shall be considered when available. A shorter meteorological record may be used in the modeling and subsequent analysis if it can be demonstrated that the shorter record includes the period or periods that cause the highest ambient air quality concentrations.

(b) The use of meteorological data other than that obtained from national weather service stations shall be approved by the commission.

(c) The most representative meteorological data that is reasonably available shall be used in air quality modeling demonstrations.

(d) The receptor grid network shall be sufficiently dense and strategically located to ensure to the satisfaction of the commission that maximum ambient air quality concentrations are predicted.

(e) All ambient air quality monitoring stations specified by the air quality division of the department of natural resources shall be included in the model's receptor grid network.

(f) The modeling demonstration shall not give credit for any stack height that exceeds good engineering practice design, unless such stack height existed prior to December 31, 1970.

R 336.1280. Permit system exemptions; cooling and ventilating equipment.

Rule 280. The permit system does not apply to any of the following:

(a) Cold storage refrigeration equipment.

(b) Comfort air conditioning or comfort ventilating systems not designed or used to remove air contaminants generated by, or released from, specific units of equipment.

(c) Natural draft hoods or natural draft ventilation not designed or used to remove air contaminants generated by, or released from, specific units of equipment.

(d) Water-cooling towers and water-cooling ponds not used for evaporative cooling of process water or not used for evaporative cooling of water from barometric jets or from barometric condensers.

R 336.1281. Permit system exemptions; cleaning, washing, and drying equipment.

Rule 281. The permit system does not apply to any of the following:

(a) Vacuum-cleaning systems used exclusively for industrial, commercial, or residential housekeeping purposes.

(b) Equipment used for portable steam cleaning.

(c) Blast-cleaning equipment using a suspension of abrasive in water and any exhaust system or collector serving them exclusively.

(d) Equipment used for washing or drying products if no volatile organic compounds are used in the process and no oil or solid fuel is burned.

(e) Laundry dryers, extractors, or tumblers for fabrics cleaned with only water solutions of bleach or detergents.

(f) Dry-cleaning equipment with a capacity of 100 or less pounds of clothes.

R 336.1282. Permit system exemptions; furnaces, ovens, and heaters.

Rule 282. The permit system does not apply to any of the following:

(a) Natural gas-fired, liquefied petroleum gas-fired, or electrically heated furnaces for heat treating glass or metals, the use of which does not involve molten materials.

(b) Porcelain enameling furnaces or porcelain enameling drying ovens and any exhaust equipment exclusively serving the furnaces or drying ovens.

(c) Kilns for firing ceramic ware that are heated exclusively by natural gas, liquefied petroleum gas, any combination thereof, or by electricity, and any exhaust system or collector exclusively serving the kilns.

(d) Blacksmith forges.

(e) Crucible furnaces, pot furnaces, or induction furnaces with a capacity of 1,000 pounds or less each, in which no sweating or distilling is conducted nor any fluxing conducted utilizing free chlorine, chloride and fluoride derivatives, and ammonium compounds.

(f) Sweet gas fuel and no. 1 and no. 2 fuel oil-burning equipment with a maximum heat input of 10,000,000 Btu/hour used for space heating, service water heating, electric power generation, or indirect heating.

(g) Fuel-burning and refuse-burning equipment used in connection with a structure that is designed and used exclusively as a dwelling for not more than 3 families.

(h) All residential cooking equipment.

(i) Bakery ovens and confection cookers where the products are edible and intended for human consumption and any exhaust system or collector exclusively serving the ovens and cookers.

(j) Sour gas-burning equipment, if the actual emission of sulfur dioxide does not exceed 1 pound per hour.

R 336.1283. Permit system exemptions; testing and inspection equipment.

Rule 283. The permit system does not apply to any of the following:

(a) Laboratory equipment used exclusively for chemical or physical analysis or experimentation, except equipment used for controlling radioactive air contaminants.

(c) Equipment for inspection of metal products.

R 336.1284. Permit system exemptions; containers.

Rule 284. The permit system does not apply to containers, reservoirs, or tanks used exclusively for any of the following:

(a) Dipping operations for coating objects with oils, waxes, greases, or natural or synthetic resins containing no organic solvents.

(b) Electrolytic plating with, electrolytic polishing of, or electrolytic stripping of, the following metals: brass, bronze, cadmium, copper, iron, lead, nickel, tin, zinc, and precious metals.

(c) Storage of butane, propane, or liquefied petroleum gas in a vessel with a capacity of less than 40,000 gallons.

(d) Storage of lubricating oils.

(e) Storage of no. 1 to no. 6 fuel oil as specified in ASTM-D-396-69, gas turbine fuel oils nos. 2-GT to 4-GT as specified in ASTM-D-2880-71, or diesel fuel oils nos. 2-D and 4-D as specified in ASTM-D-975-68. These ASTM methods are herein adopted by reference. Copies may be inspected at the Lansing office of the air quality division of the department of natural resources. Copies may be obtained from the Department of Natural Resources, P.O. Box 30028, Lansing, Michigan 48909, at a cost of $4.00 each. Copies may also be obtained from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103, at a cost of $4.00 each.

(f) Storage of sweet crude or sweet condensate in a vessel with a capacity of less than 40,000 gallons.

(g) Storage of sour crude or sour condensate in a vessel with a capacity of less than 40,000 gallons if vapor recovery or its equivalent is used to prevent the emission of vapors to the atmosphere.

(h) Gasoline storage and handling equipment at loading facilities handling less than 20,000 gallons per day or at dispensing facilities.

R 336.1285. Permit system exemptions; miscellaneous.

Rule 285. The permit system does not apply to any of the following:

(a) Maintenance structural changes, parts replacement, repairs considered by the commission to be minor, or relocation of equipment within the same building not involving any change in the quality, nature, or quantity of the emission of an air contaminant therefrom. Examples of minor parts replacement or repairs include the following:

(i) Replacing bags in a baghouse.

(ii) Replacing wires, plates, rappers, or electric circuitry in an electrostatic precipitator which does not measurably alter the design efficiency of the unit.

(iii) Replacement of fans, pumps, or motors which does not alter the operation of a source or performance of a control device.

(iv) Boiler tubes.

(v) Piping and ductwork.

(vi) Replacement of engines, compressors, or turbines as part of a normal maintenance program.

(b) Equipment used for any mode of transportation.

(c) Internal combustion engines with less than 10,000,000 Btu/hour maximum heat input.

(d) Vacuum pumps in laboratory or pilot plant operations.

(e) Portable brazing, soldering, or welding equipment.

(f) Grain, metal, or mineral extrusion presses.

(g) The following equipment and an exhaust system or collector exclusively serving the equipment:

(i) Drop hammers or hydraulic presses for forging or metalworking.

(ii) Die casting machines.

(iii) Equipment for surface preparation of metals by use of aqueous solutions, except for acid solutions.

(iv) Atmosphere generators used in connection with metal heat treating processes.

(v) Equipment used exclusively for sintering of glass or metals, but not exempting equipment used for sintering metal-bearing ores, metal scale, clay, flyash, or metal compounds.

(vi) Equipment for brazing, welding, soldering, carving, cutting, routing, turning, drilling, machining, sawing, surface grinding, sanding, planing, buffing, or polishing ceramic artwork, leather, metals, plastics, rubber, wood, or wood products on a nonproduction basis.

(vii) Photographic process equipment by which an image is reproduced upon material sensitized to radiant energy.

(viii) Battery charging operations.

(h) Lagoons and sewage treatment plant facilities, excluding lime storage equipment, sewage sludge incinerators, and heat treatment processes.

(i) Livestock and livestock handling systems from which the only potential air contaminant emission is odorous gas.

(j) Equipment for handling and drying grain on a farm.

(k) Equipment used for oil and gas well drilling, testing, completion, and workover activities.

(l) Portable steam deicers that have a heat input of less than 1,000,000 Btu's per hour.

**PART 3. EMISSION LIMITATIONS AND PROHIBITIONS--PARTICULATE MATTER

R 336.1301. Standards for density of emissions.

Rule 301. (1) A person shall not cause or permit to be discharged into the atmosphere, from a single source of emission, a visible air contaminant with a density of more than 20% opacity, except in the following situations:

(a) A visible air contaminant with a density of not more than 40% opacity may be emitted for not more than 3 minutes in any 60-minute period, but this emission shall not be permitted on more than 3 occasions during any 24-hour period.

(b) Where the presence of uncombined water vapor is the only reason for failure of an emission to meet the requirements of this rule.

(c) Where specifically permitted by the commission in a case where compliance is not technically and economically feasible and where all other requirements of the commission's rules are being met.

(2) The provisions of this rule shall not apply to visible emissions from slot-type coke ovens.

R 336.1302. Points of measuring density.

Rule 302. The density of an air contaminant emission shall be measured at the point of maximum opacity not influenced by the presence of uncombined water.

R 336.1303. Grading visible emissions.

Rule 303. Opacity of a visible emission of an air contaminant shall be graded by certified observers using a technique approved by, and on file with, the commisison. Certification of observers shall be by procedures approved by, and on file with, the commission.

** Extension of compliance date until December 31, 1981 for Detroit Edison's St. Clair Power Plant. See Non-Compliance Schedules Section. 8/25/80 Federal Register Publication date.

Extension of compliance date until 12/31/83 for Dundee Cement Plant of Monroe County. See Non-Compliance Schedules Section. 8/11/80 Federal Register Publication date.

R 336.1320. Compliance programs.

Rule 320. (1) A person responsible for the operation of any existing source subject to the provisions of rule 331, table 31, items A.3, A.4, B.5, G.2, I, and J shall submit to the Commission, within 1 year after the effective date of such rule, a written program, acceptable to the commission, for compliance with such rule or evidence of compliance with such rule. Such evidence shall include available emission data, material balance calculations, control equipment specifications, or other information that demonstrates compliance.

(2) The program required by subrule (1) shall include the method by which compliance with such rule shall be achieved, a description of new equipment to be installed or modifications to existing equipment to be made, and a timetable which specifies, at a minimum, the following dates:

(a) The date equipment shall be ordered.

(b) The date construction or modification of equipment shall begin.

(c) The date initial start-up of equipment shall begin.

(d) The date final compliance shall be achieved, if not the same as the date specified in subdivision (c).

R 336.1330. Electrostatic precipitator control systems; where required.

Rule 330. (1) After July 1, 1980, it shall be unlawful to operate any cement kiln, kraft recovery boiler, lime kiln, calciner, pulverized coal-fired boiler, basic oxygen furnace, or gypsum dryer controlled by an electrostatic precipitator control system unless each transformer-rectifier set of the electrostatic precipitator is equipped with a saturable core reactor, silicon-controlled rectifier linear reactor, or equivalent type automatic control system approved by the commission. Each automatic controller shall be set to provide maximum power, or optimal power if operating in a sparking mode, from its respective transformer-rectifier set.

(2) Each transformer-rectifier set subject to the provisions of subrule (1) shall be capable of operating in a spark-limited mode and shall meter and display the primary RMS voltage and amperage, the average secondary amperage, and the average spark rate. The requirement to meter and display the average spark rate shall not apply if the automatic controller employs solid state circuitry to preset power levels based on sparking rate limits.

(3) The commission shall waive the requirements of subrule (2) if both of the following conditions are met:

(a) A satisfactory demonstration is made that the precipitator is capable of providing for compliance with all applicable particulate emission and opacity limits.

(b) The precipitator existed before July 1, 1979, or was covered by an application for a permit to install received by the commission prior to July 1, 1979.

* R 336.1331. Emission of particulate matter.

Rule 331. (1) It is unlawful for a person to cause or allow the emission of particulate matter from any source in excess of any of the following limits:

(a) The maximum allowable emission rate listed in table 31.

(b) The maximum allowable emission rate listed by the commission on its own initiative or by application. A new listed value shall be based upon the control results achievable with the application of the best technically feasible, practical equipment available. This applies only to sources not assigned a specific emission limit in table 31.

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* Extension of compliance date until 12/31/83 for Dundee Cement Plant of Monroe County. See Non-Compliance Schedules Section. 8/11/80 Federal Register Publication date.

(c) The maximum allowable emission rate specified as a condition of a permit to install or a permit to operate.

(d) The maximum allowable emission rate specified in a voluntary agreement, performance contract, stipulation, or an order of the commission.

(e) The maximum allowable emission rate as determined by table 32 for sources not covered in subdivisions (a) to (d).

(2) Compliance with any emission limit specified in this rule shall be determined by using the corresponding reference test method specified in table 31.

TABLE 31

Particulate matter emission schedule

Source	Capacity rating for each unit	Maximum allowable emission at operating conditions(a) (lbs. particualte per 1,000 lbs. gas except as noted)	Applicable reference test method
A. Fuel burning equipment			
1. Pulverized coal (includes cyclone furnaces)	0-1,000,000 lbs. steam per hour.	See figure 31 for maximum emission limit.	5B or 5C
	Over 1,000,000 lbs. steam per hour.	Apply to commisison for specific emission limit.	
2. Other modes of firing coal (other than pulverized)	0-100,000 lbs. steam per hour.	0.65 until superseded by A.3 and A.4.	5B or 5C
	100,000-300,000 lbs. steam per hour.	0.65 - 0.45(b)	
	Over 300,000 lbs. steam per hour.	Apply to commission for specific emission limit.	
3. Other modes of firing coal (other than pulverized) Existing fuel-burning equipment that is in a single structure which has a combined coal-fired existing capacity less than 250,000,000 Btu per hour.	0-20,000,000 Btu per hour input.	0.65 effective immediately.	5B or 5C
	20,000,001-100,000,000 Btu per hour input.	0.45 compliance shall be achieved as expeditiously as practical, but not later than July 1, 1981.	5B or 5C
	Over 100,000,000 Btu per hour input.	0.30 compliance shall be achieved as expeditiously as practical, but not later than December 31, 1982.	5B or 5C
4. Other modes of firing coal (other than pulverized) Existing fuel-burning equipment that is in a single structure which has a combined existing capacity equal to or greater than 250,000,000 Btu per hour.	All sizes	0.30 compliance shall be achieved as expeditiously as practical, but not later than December 31, 1982.	5B or 5C
5. Other modes of firing coal (new sources)(f)	All sizes	0.10	5B or 5C
6. Wood (sawdust, shavings, hogged, other) where heat input of wood fuel 75% of total heat input		0.50	5B or 5C
All other combination fuel-burning equipment that uses wood as 1 of the fuels.		Apply to commission for specific emission limit.	
7. Combination fuel-firing or combination fuel/waste-firing (new sources)(f)	All sizes	Apply to commission for specific emission limit.	5B or 5C
B. Incinerators	Rating in lbs. waste per hour		
1. Residential apartments, commercial and industrial(c)(d)	0-100	0.65	5B or 5C
	Over 100	0.30	5B or 5C
2. Municipal	All	0.30	5B or 5C
3. Pathological (d)		0.20	5A, 5B or 5C
4. Manure drying or incineration(d)		0.20	5A, 5B or 5C
5. Liquid waste incinerator		0.10 compliance shall be achieved as expeditiously as practical, but not later than December 31, 1982.	5B or 5C
6. Sewage sludge incinerator		0.20 compliance shall be achieved as expeditiously as practical, but not later than December 31, 1982.	5B or 5C
C. Steel manufacturing			
1. Open hearth furnaces(d)*		0.15	
2. Basic oxygen furnaces(d)*		0.15	
3. Electric furnaces(d)*		0.15	
4. Sintering plants		0.20	
5. Blast furnaces		0.15	
6. Heating and reheating furnaces		0.30	
7. Coke oven coal preheater equipment effective 7/1/79		0.45(g)	5B or 5C

Source		Lbs. particulate/1,000 lbs. gas except as noted	Applicable reference test method
D. Ferrous cupola foundry operations	Total plant melt rate in tons/hr.		
1. Existing production cupolas(h)	0-10	0.40	5A, 5B or 5C
	10-20	0.25	5A, 5B or 5C
	over 20	0.15	5A, 5B or 5C
2. Existing jobbing cupolas(h)		0.40	5A, 5B or 5C
3. Electric arc melting		0.10	5A, 5B or 5C
4. Sand handling		0.10	5A, 5B or 5C
5. All new cupolas	0-15	1.8 - 0.7(b)(i)	5A, 5B or 5C
	over 15	0.7(i)	
E. Chemical and mineral kilns		0.20	5B or 5C
F. Asphalt paving plants			
1. Located within a priority I or II area (before January 1, 1980)		0.30	5A, 5B or 5C
2. Located within a priority I or II area (after January 1, 1980)		0.10	5A, 5B or 5C
3. Located outside priority I and II areas		0.30	5A, 5B or 5C
G. Cement manufacture			
(Up to 15,000 barrels per day kiln capacity)			
1. Kiln - wet or dry process		0.25	5B or 5C
2. Clinker coolers (before January 1, 1981)		0.30	5B or 5C
(after January 1, 1981)		0.10	5B or 5C
3. Grinding, crushing, and other material handling		0.15	5B or 5C
Note: A maximum allowable emission listing shall be applied for to the commission for all kiln installations which will result in a total plant kiln capacity in excess of 15,000 barrels of cement per day.			
H. Iron ore pelletizing	Gas flow rate (SCFM)		
Grate kilns and traveling grates	Greater than 600,000	Apply to commission for specific emission limit.	
	300,000 to 600,000	0.10	5A, 5B or 5C
	100,000 to 300,000	0.15	5A, 5B or 5C
	less than 100,000	0.20	5A, 5B or 5C
I. Fertilizer plants (includes ammoniator, granulator, reactor, dryer, cooler blender and all other processes) Compliance shall be achieved as expeditiously as practical, but not later than January 1, 1981.		0.10	5A, 5B or 5C
J. Exhaust systems serving material handling equipment not otherwise listed in table 31 Compliance shall be achieved as expeditiously as practical, but not later than July 1, 1981.		0.10	5A, 5B or 5C

Notes:

(a) Fuel burning and incineration limitation shall be calculated to 50% excess air.

(b) Emission limitations for specific ratings are determined by linear interpolation between the ranges shown.

(c) These emission limitations do not apply to domestic incinerators (defined as having not more than 5 cubic feet of storage capacity).

(d) Afterburner or approved equivalent is mandatory.

(d)* Air cleaning equipment shall be designed for maximum emission of 0.1 pounds per thousand pounds of gas.

(e) Differentiation between jobbing and production foundries.
Cupolas used in a jobbing foundry are the same as those used in a production foundry and vary in size only according to the quantity of iron melted per hour.
However, the cupolas in a jobbing foundry are run intermittently just long enough at one time to pour the molds that are ready on the foundry floor, job by job. This might be for a 2- to 4-hour period per day for any number of days per week.
Production foundry cupolas melt continuously to pour a succession of molds that are constantly being prepared to reserve this continuous flow of iron. This could become 8 hours, 16 hours, or 24 hours per day for any number of days per week.

(f) New sources are defined as those for which the permit to install was issued after the effective date of these rules.

(g) Pounds particulate/ton of coal fed to the coal preheater.

(h) Any existing cupolas are considered to be in compliance with table 31 of rule 331 if they meet the particulate emission limit for new cupolas.

(i) Pounds of particulate per ton of charged material.

TABLE 32

Allowable rate of emission based on process weight rate[a]

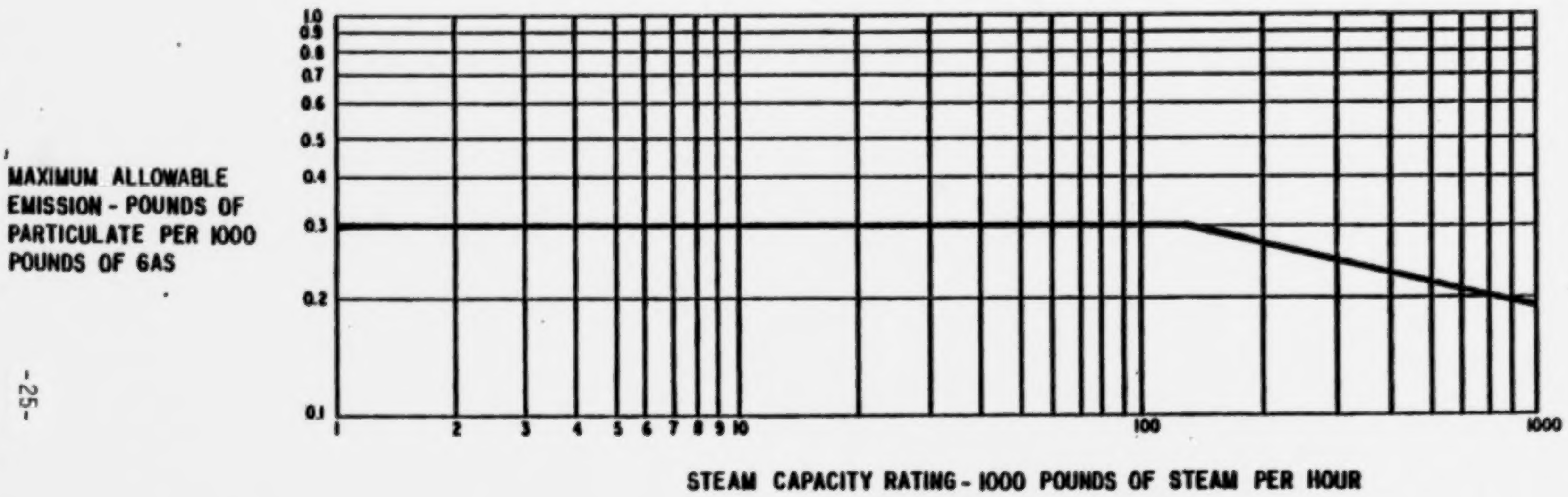
Process weight rate		Rate of emission	Process weight rate		Rate of emission
Lb/hr	Tons/hr	Lb/hr	Lb/hr	Tons/hr	Lb/hr
100	0.05	0.55	16,000	8.00	16.5
200	0.10	0.88	18,000	9.00	17.9
400	0.20	1.40	20,000	10.	19.2
600	0.30	1.83	30,000	15.	25.2
800	0.40	2.22	40,000	20.	30.5
1,000	0.50	2.58	50,000	25.	35.4
1,500	0.75	3.38	60,000	30.	40.0
2,000	1.00	4.10	70,000	35.	41.3
2,500	1.25	4.76	80,000	40.	42.5
3,000	1.50	5.38	90,000	45.	43.6
3,500	1.75	5.95	100,000	50.	44.6
4,000	2.00	6.52	120,000	60.	46.3
5,000	2.50	7.58	140,000	70.	47.8
6,000	3.00	8.56	160,000	80.	49.0
7,000	3.50	9.49	200,000	100.	51.2
8,000	4.00	10.4	1,000,000	500.	69.0
9,000	4.50	11.2	2,000,000	1,000.	77.6
10,000	5.00	12.0	6,000,000	3,000.	92.7
12,000	6.00	13.6			

[a] Interpolation of the data in this table for process weight rates up to 60,000 lb/hr shall be accomplished by use of the equation $E = 4.10\ P^{0.67}$ and interpolation and extrapolation of the data for process weight rates in excess of 60,000 lb/hr shall be accomplished by use of the equation $E = 55.0\ P^{0.11} - 40$, where E = rate of emission in lb/hr and P = process weight in tons/hr.

Process weight — The total amount of all material introduced into an industrial operation, including solid fuels, but excluding liquid fuels and gaseous fuels when these are used as fuels and air introduced for purposes of combustion.

Process weight rate — For continuous or long-term operation: The total process weight for the entire period of operation or for a typical portion thereof, divided by the number of hours of such period or portion thereof. For batch operations: The total process weight for a period which covers a complete operation or an integral number of cycles, divided by the hours of actual process operation during such period.

FIGURE 31



Note: It is required that a maximum allowable emission listing be applied for to the air pollution control commission for all pulverized coal (and cyclone) furnaces having capacity ratings in excess of 1 million pounds of steam per hour.

TABLE 33

Priority I areas

County	Area
Calhoun	T2S, R4W, Section 34.
Genesee	Starting at intersection of Stewart Avenue and north Saginaw Street, then east along Stewart Avenue to Dort Highway to Franklin Avenue to Hamilton Avenue to Saginaw Street to Stewart Avenue.
Saginaw	T12N, R5E, Sections 7, 8, 17, and 18.
Wayne	Area included within the following (counter clockwise): Lake St. Clair to Moross Road to Seven Mile Road to VanDyke Road to Eight Mile Road to Wyoming Road to Seven Mile Road to Schaeffer Road to Fenkell Road to Greenfield Avenue to Joy Road to Southfield Expressway to Ford Road to Telegraph Road to Cherry Hill Road to Beech-Daly Road (extended) to Michigan Avenue to Inkster Road to Carlysle Street to Middle Belt Road to Vanborn Road to Wayne Road to Pennsylvania Road to Middle Belt Road to Sibley Road to Telegraph Road to King Road to Grange Road to Sibley Road to Jefferson Avenue to Bridge Street (Grosse Ile) extended to Detroit River.

TABLE 34

Priority II areas

County	Area
Bay	T14N, R5E, Sections 14-16 and 21-23.
Berrien	T4S, R18W, Sections 7, 8, 17-20, 29, and 30. T4S, R19W, Sections 12-14 and 23-27.
Delta	T39N, R22W, Sections 6-8, 17-20, 29, and 30; T39N, R23W, Sections 1, 12, and 13.
Emmet	T34N, R6W, Sections 1-3 and 9-12.
Genesee	Starting at intersection of Carpenter Road and DuPont Street, then east on Carpenter Road to Center Road, then south to M-21, then west to I-475 to Bristol Road, then west to I-75, then north to Corunna Road (M-56), then east to Flint city limits, then north to Pasadena Avenue, then east to DuPont Street to Carpenter Road.
Ingham	T4N, R2W, Sections 2-11 and 14-23.
Kent	T7N, R11W, Sections 19, 30, and 31; T7N, R12W, Sections 22-27 and 34-36.
Macomb	T4N, R14E, Sections 27, 28, 33, and 34; Macomb County south of the T2N north township line.
Manistee	T21N, R16W, Sections 7,18, and 19; T21N, R17W, Sections 12 and 13.
Marquette	T48N, R25W, Sections 1 and 2.
Mason	T18N, R18W, Sections 13, 14, 23, and 24.
Midland	T14N, R2E, Sections 14-16, 21-23, 26-28, and 33-35.
Monroe	Exeter, Ash, Berlin, Raisinville, Monroe, and Frenchtown Townships, incorporated cities and towns inclusive.
Muskegon	T9N, R16W, Sections 5 and 6; T10N, R16W, Sections 21, 22, and 27-34.
Oakland	T3N, R10E, Sections 15, 16, 21, 22, 27, and 28; Area included within Coolidge Road, Ten Mile Road, Campbell Road, Fourteen Mile Road, Dequindre Road, and Eight Mile Road.
Saginaw	T12N, R4E, Sections 1, 12-15, 22-27, and 34-36; T12N, R5E, Sections 4-6, 9, 16, 19-21, and 28-33.
St. Clair	T6N, R17E, Sections 2-4, 9-11, 14-16, 21, 22, and 28.
Washtenaw	Area within Cross Street, Huron Street, Harris Road, and I-94 near Ypsilanti.
Wayne	The area included within the following (counter clockwise): Lake St. Clair to Eight Mile Road to Schaeffer Road to McNichols Road to Greenfield Avenue to Schoolcraft Avenue to Evergreen Road to Joy Road to Telegraph Road to Ford Road to Beech-Daly Road to Cherry Hill Road to Inkster Road to Carlysle Street to Middle Belt Road to VanBorn Road to Wayne Road to Ecorse Road to Haggerty Highway to Tyler Road to Belleville Road to I-94 to Rawsonville Road to Oakville Waltz Road to Will Carleton Road to the Huron River to Lake Erie, except subarea listed in table 33.

R 336.1349. Coke oven compliance date.

Rule 349. A person subject to the provisions of rules 350 to 357 shall achieve compliance with such rules as expeditiously as practical, but not later than December 31, 1982.

R 336.1350. Emissions from larry-car charging of slot-type coke ovens.

Rule 350. During a charging period, a person shall not cause or permit to be discharged into the atmosphere any visible emission from any larry-car, charging holes, or leveling door, except that a visible emission may be emitted for a period or periods aggregating 80 seconds during any 4 consecutive charging periods on a coke battery.

R 336.1352. Pushing emissions from slot-type coke ovens.

Rule 352. (1) During a pushing operation, a person shall not cause or permit to be discharged into the atmosphere, from any opening between the oven and the coke-receiving car, a visible air contaminant with a density of more than 40% opacity, except that 1 pushing operation of any 8 consecutive pushing operations shall be permitted to exceed this requirement.

(2) A person shall not cause or permit to be discharged into the atmosphere, from the coke in any coke-receiving car as it travels from the oven to the quench tower, a visible air contaminant with a density of more than 40% opacity, except that 1 trip to the quench tower in any 8 consecutive trips to the quench tower shall be permitted to exceed this requirement.

R 336.1353. Standpipe assembly emissions during coke cycle from slot-type coke ovens.

Rule 353. During a coking cycle, a person shall not cause or permit to be discharged into the atmosphere any visible emission from any standpipe assembly, except that visible emissions may be emitted from a number of standpipe assembly emission points on the coking cycle not to exceed 4% of all standpipe assembly emission points on a coke battery.

R 336.1354. Standpipe assembly emissions during decarbonization from slot-type coke ovens.

Rule 354. (1) A person shall not cause or permit to be discharged into the atmosphere, from an open standpipe lid, a visible air contaminant with a density of more than 20% opacity, except for the first 2 minutes of the decarbonization period.

(2) A person shall not cause or permit any standpipe lid to be open for decarbonization on any oven which is more than 3 ovens ahead of the oven being pushed.

R 336.1355. Coke oven gas collector main emissions from slot-type coke ovens.

Rule 355. A person shall not cause or permit to be discharged to the atmosphere any visible emission from the coke oven gas collector main.

R 336.1356. Coke oven door emissions from slot-type coke ovens; doors that are 5 meters or shorter.

Rule 356. (1) A person shall not cause or permit to be discharged into the atmosphere any visible emission from any pushside door, cokeside door, or leveling door serving a coke oven equipped with doors that are 5 meters or shorter, with the following exceptions:

(a) A visible emission may be emitted from not more than 10% of the total pushside doors on the coke battery.

(b) A visible emission may be emitted from not more than 10% of the total cokeside doors on the coke battery.

(c) A visible emission may be emitted from not more than 10% of the total leveling doors on the coke battery.

(2) Visible emissions emanating from the doors of a coke oven that has been pipeline charged within 1 hour of the time of observation shall not be considered when calculating the percentage of doors leaking.

R 336.1357. Coke oven door emissions from slot-type coke ovens; doors that are taller than 5 meters.

Rule 357. (1) A person shall not cause or permit to be discharged into the atmosphere any visible emission from any pushside door, cokeside door, or leveling door serving a coke oven equipped with doors that are taller than 5 meters, with the following exceptions:

(a) A visible emission may be emitted from not more than 12% of the total pushside doors on the coke battery.

(b) A visible emission may be emitted from not more than 12% of the total cokeside doors on the coke battery.

(c) A visible emission may be emitted from not more than 10% percent of the total leveling doors on the coke battery.

(2) A person shall not cause or permit the operation of a coke battery equipped with coke oven doors taller than 5 meters, unless both of the following provisions are met:

(a) There is access to a facility to maintain and repair doors and buckstays.

(b) An inventory of cleaned and repaired doors is maintained to comply with all of the following:

(i) The number of inventoried pushside doors exceeds 5% of the number of pushside doors in service.

(ii) The number of inventoried cokeside doors exceeds 5% of the number of cokeside doors in service.

(iii) The number of inventoried leveling doors exceeds 5% of the number of leveling doors in service.

PART 4. EMISSION LIMITATIONS AND PROHIBITIONS - SULFUR-BEARING COMPOUNDS

R 336.1401. Emission of sulfur dioxide from power plants.

Rule 401. (1) In a power plant, it is unlawful for a person to burn fuel that does not comply with the sulfur content limitation of table 41 or which, when burned, results in sulfur dioxide emissions exceeding an equivalent emission rate as shown in table 42, unless the following conditions are met:

(a) The source of fuel burning is not subject to federal emission standards for new stationary sources.

(b) An installation permit, if required by part 2, was approved by the commission before August 17, 1971.

(c) The user furnishes evidence that the fuel burning does not create or contribute to an ambient level of sulfur dioxide in excess of the applicable ambient air quality standards. The evidence shall consist of air quality data or stack dispersion calculations, or both, satisfactory to the commission.

(d) The user is operating in compliance with a voluntary agreement, order, stipulation, or variance from the commission.

(2) Notwithstanding the provisions of subrule (1), an exception from the limitations of table 41 shall not be permitted after January 1, 1980, unless specific authorization is granted by the commission.

(3) A person responsible for operation of a source that, on the effective date of the 1973 amendment to this rule or for any anticipated time in the future, is or will be using fuel with a sulfur content in excess of that allowed to be burned on July 1, 1978, as listed in table 41, or which, on such effective date or any anticipated time in the future, is or will be emitting sulfur dioxide in excess of the equivalent emission for that fuel, as shown in table 42, shall submit to the commission a written program for compliance with this rule within 60 days after such effective date. This requirement does not apply to a source for which the commission has approved an exception to table 41 under the provisions of subrule (1).

(4) The program required by subrule (3) shall include the method by which compliance shall be achieved, a complete description of new equipment to be installed or modifications to existing equipment to be made, and a timetable which specifies, at a minimum, the following dates:

(a) The date equipment shall be ordered.

(b) The date construction or modification of equipment shall begin.

(c) The date initial start-up of equipment shall begin.

(d) The date emissions shall be reduced to levels shown in tables 41 and 42.

(5) The commission may allow any source that is required to submit a compliance program under subrule (3) an extension to the programmed compliance date, if the following conditions are met:

(a) The source of fuel burning is not subject to federal emission standards for new stationary sources.

(b) An installation permit, if required by part 2, was approved by the commission before August 17, 1971.

(c) The user furnishes satisfactory evidence to the commission that the fuel burning does not create or contribute to an ambient level of sulfur dioxide in excess of the applicable ambient air quality standards.

(6) A person shall not cause or permit the burning of fuel in any fuel-burning equipment that results in an average emission of sulfur dioxide for any calendar month at a rate greater than was emitted by that fuel-burning equipment for the corresponding calendar month of the year 1970, unless otherwise authorized by the commission.

(7) The use of fuels having sulfur contents as set forth in this rule shall not allow degradation in the mass rate of particulate emission, unless otherwise authorized by the commission. The commission may require source emission tests which may be performed by, or under the supervision of, the commission at the expense of the owners and may require the submission of reports to the commission both before and after changes are made in the sulfur content in fuel.

TABLE 41 *

Sulfur in fuel limitations for fuel-burning equipment

Plant capacity(a) 1000 lbs. Steam per hour	Maximum sulfur content in fuel(b) Percent by weight(c)	
	July 1, 1975	July 1, 1978
0-500	2.0	1.5
Over 500	1.5	1.0

TABLE 42. Equivalent emission rates*

% Sulfur in fuels(c)	Parts per million by volume Corrected to 50% excess air		Pounds of sulfur dioxide per Million Btu of heat input	
	Solid fuel(d) (12,000 Btu/lb)	Liquid fuel(e) (18,000 Btu/lb)	Solid fuel(d) (12,000 Btu/lb)	Liquid fuel(e) (18,000 Btu/lb)
1.0	590	420	1.67	1.11
1.5	890	630	2.50	1.67
2.0	1180	840	3.33	2.22

(a) For the purpose of this rule, "plant capacity" is defined as the total steam production capacity of all coal- and oil-burning equipment in a power plant as of August 17, 1971. A "power plant" is defined as a single structure devoted to steam or electric generation, or both, and may contain multiple boilers.

(b) "Maximum sulfur content in fuel" is defined as the average sulfur content in all fuels burned at any one time in a power plant. The sulfur content shall be calculated on the basis of 12,000 Btu per pound for solid fuels and 18,000 Btu per pound for liquid fuels.

(c) The determination of sulfur content (percent by weight) of fuel shall be carried out in accordance with a procedure acceptable to the commission.

(d) Solid fuels include both pulverized coal and all other coal.

(e) Liquid fuels include distillate oil (No. 1 and No. 2), heavy oil (No. 4, No. 5, and No. 6), and crude oil.

*Company	Final Compliance Date	Federal Register Publication of Approval
Detroit Edison's Monroe Power Plant	01/01/85	12/21/79
Consumer's Power Co's JH Campbell Plant	01/01/85	12/24/80
S.D. Warren Co's Muskegon Power Plant	11/01/84	01/27/81
Consumer's Power Co's B.C. Cobb Plant	01/01/85	05/01/81
Union Camp Corporation's Monroe Mill	01/01/85	05/14/81
Northern Michigan Electric Cooperative's Advance Steam Plant	01/01/85	07/02/81

Refer to Non-Compliance schedules section

Commission Order for Lansing Board of Water and Light. See NonRegulatory Section 12/17/80 Publication of Approval.

R 336.1402. Emission of sulfur dioxide from fuel-burning sources other than power plants.

Rule 402. (1) Except as provided in rule 401 and subrule (2), after January 1, 1981, it is unlawful for a person to cause or allow the emission of sulfur dioxide from the combustion of any coal or oil fuel in excess of 1.7 pounds per million Btu's of heat input for oil fuel or in excess of 2.4 pounds per million Btu's of heat input for coal fuel.

(2) The provisions of this rule do not apply to a fuel-burning source that is unable to comply with the specified emission limits because of sulfur dioxide emissions caused by the presence of sulfur in other raw materials charged to the fuel-burning source. This exception shall apply if at any time the actual sulfur dioxide emission rate exceeds the expected theoretical sulfur dioxide emission rate from fuel burning. The expected theoretical sulfur dioxide emission rate shall be based on the quantity of fuel burned and the average sulfur content of the fuel.

R 336.1403. Oil and natural gas producing or transporting facilities and natural gas processing facilities; emissions; operation.

Rule 403. (1) Except as provided in subrule (3), it is unlawful for a person to cause or allow the emission of sour gas from an oil or natural gas producing or transporting facility or a natural gas processing facility without burning or equivalent control of hydrogen sulfide and mercaptans.

(2) Except as provided in subrule (3), sour gas that is burned at an oil or natural gas producing or transporting facility or at a natural gas processing facility shall be burned in a smokeless flare, an approved incinerator, or other combustion system with elevated discharge to the atmosphere. The flare, incinerator, or other combustion system shall be equipped with a continuously burning pilot flame and failsafe sensors capable of detecting flame extinguishment, unless otherwise authorized by the commission.

(3) The provisions of subrules (1) and (2) shall not apply to those crude oil producing facilities which serve a well or group of wells which attained an average production level of 10 or less barrels per day per well prior to January 1, 1978, unless the commission has received 1 complaint of odors regarding the facility, and the owner or operator is unable to or fails to demonstrate to the satisfaction of the commission that the uncontrolled hydrogen sulfide and mercaptan emissions do not cause an odor nuisance or health hazard.

(4) A person shall not cause or allow the emission of sulfur dioxide from a new sweetening facility unless such emissions are controlled using the best available control technology.

(5) The operator of a sour gas, crude, or condensate sweetening facility shall do all of the following:

(a) Monitor the mass flow rate of hydrogen sulfide either entering the plant or going to the waste gas flare or flares on a periodic schedule specified by the commission. The monitoring program shall include a determination of the hydrogen sulfide concentration using colorimetric detector tubes or their equivalent and a determination of the volumetric gas flow rate. The monitoring data shall be submitted to the commission in an acceptable format within 30 days following the end of the month in which the data was collected.

(b) Provide fencing, warning signs, or other measures as necessary to warn or deter unauthorized individuals from entering the plant property or buildings. Signs shall read: "Danger--Poison Gas" with no less than 1 sign on each side of the plant property.

(c) Provide control of malodorous emissions from any pressure relief valve or valves, storage tanks, and dehydrator vent or vents by burning or equivalent control.

(d) Conduct a program of continuous monitoring of concentrations of hydrogen sulfide in any building enclosing a sweetening process. The sensor shall be placed as close to process equipment as practicable. The system shall be designed, installed, and maintained to provide a visual alarm when the hydrogen sulfide concentration exceeds 50 ppm.

(e) Automatically begin a safe and orderly shutdown of all process inflow streams to the facility if the concentration of hydrogen sulfide is more than 100 ppm in any building enclosing a sweetening process. Full operation may be resumed only after successful corrective measures have been applied.

(f) Automatically commence shut-in of the facility within 1 second after extinguishment of the flare flame, unless otherwise authorized by the commission. Operation of the facility shall not continue unless corrective measures taken to reignite the flame are successful.

(6) A new sweetening facility shall not be installed at a distance of less than 1,300 feet from an existing residence, unless otherwise authorized by the commission. Such authorization shall depend upon a satisfactory showing by a permit applicant that an odor nuisance shall not result from a lesser setback distance.

R 336.1404. Emission of sulfuric acid mist from sulfuric acid plants.

Rule 404. After July 1, 1980, it is unlawful for a person to cause or allow the emission of sulfuric acid mist from any sulfuric acid plant in excess of 0.50 pounds per ton of acid produced, the production being expressed as 100% H_2SO_4. Compliance with this limit shall be demonstrated using reference test method 8.

PART 6. EMISSION LIMITATIONS AND PROHIBITIONS--EXISTING SOURCES OF VOLATILE ORGANIC COMPOUND EMISSIONS

R 336.1601. Definitions.

Rule 601. For the purpose of this part, an "existing source" means any process or process equipment that has been placed in use or for which application was made to the commission prior to July 1, 1979. A process or process equipment operated for research, development, or pilot studies shall be excluded from this definition if it is not operated for the purpose of producing saleable products or goods.

R 336.1602. General provisions for existing sources of volatile organic compound emissions.

Rule 602. It is unlawful for a person to cause or allow the emission of volatile organic compounds from any existing source in excess of the provisions of any rule of this part or the maximum allowable emission rate specified in a permit to install or a permit to operate, whichever results in the lower maximum allowable emission rate.

R 336.1603. Compliance program.

Rule 603. (1) A person responsible for the operation of any existing source subject to the provisions of rules 604, 605, 609, 610, 615, 616, and 617 shall submit to the commission a written program for compliance with such rules or evidence of compliance with such rules. Such evidence shall include available emission test data, material balance calculations, control equipment specifications, or other information that demonstrates compliance. The written program for compliance shall be submitted to the commission within 1 year after the effective date of the rule if the final date of compliance is on or before December 31, 1982, or within 18 months after the effective date of the rule if the final date of compliance is after December 31, 1982.

(2) The program required by subrule (1) shall include the method by which compliance with such rule shall be achieved, a complete description of new equipment to be installed or modifications to existing equipment to be made, and a timetable which specifies, at a minimum, the following dates:

(a) The date equipment shall be ordered.
(b) The date construction or modification of equipment shall begin.
(c) The date initial start-up of equipment shall begin.
(d) The date final compliance shall be achieved, if not the same as the date specified in subdivision (c).

(3) The compliance program required by subrule (1) may address a combination of sources if the following conditions are met:

(a) All sources are subject to the emission limitations of this part.
(b) All sources are within the same geographical site.
(c) The total volatile organic compound emissions do not exceed the sum of the allowable emissions from each source.
(d) Equivalent emission reductions are accomplished in the time interval required for individual sources.

R 336.1604. Storage of organic compounds having a true vapor pressure of more than 1.5 psia, but less than 11 psia, in existing stationary vessels of more than 40,000-gallon capacity.

Rule 604. (1) After April 30, 1981, it is unlawful for a person to store any organic compound having a true vapor pressure of more than 1.5 psia, but less than 11 psia, at actual storage conditions in any existing stationary vessel of more than 40,000-gallon capacity, unless 1 of the following conditions is met:

(a) The vessel is a pressure tank capable of maintaining working pressures sufficient to prevent organic vapor or gas loss to the atmosphere at all times, except under emergency conditions.

(b) The vessel is equipped and maintained with a floating roof consisting of a pontoon-type, double-deck-type, or an internal floating cover which rests upon, and is supported by, the surface of the liquid and is equipped with a closure seal or seals to close the space between roof edge and tank wall. The seal or any seal fabric shall have no visible holes, tears, or other openings.

(c) The vessel is equipped and maintained with a vapor recovery system, or other control system approved by the commission, which recovers not less than 90% by weight of the uncontrolled organic vapor that would otherwise be emitted into the atmosphere.

(2) All openings, except stub drains, in any stationary vessel subject to the provisions of this rule shall be equipped with covers, lids, or seals such that all of the following conditions are met:

(a) The cover, lid, or seal is in the closed position at all times, except when in actual use.

(b) Automatic bleeder vents are closed at all times, except when the roof is floated off, or landed on, the roof leg supports.

(c) Rim vents, if provided, are set at the manufacturer's recommended setting or are set to open when the roof is being floated off the roof leg supports.

R 336.1605. Storage of organic compounds having a true vapor pressure of 11 or more psia in existing stationary vessels of more than 40,000-gallon capacity.

Rule 605. (1) After April 30, 1981, it is unlawful for a person to store any organic compound having a true vapor pressure of 11 or more psia at actual storage conditions in any existing stationary vessel of more than 40,000-gallon capacity, unless 1 of the following conditions is met:

(a) The vessel is a pressure tank capable of maintaining working pressures sufficient to prevent organic vapor or gas loss to the atmosphere at all times, except under emergency conditions.

(b) The vessel is equipped and maintained with a vapor recovery system, or other control system approved by the commission, which recovers not less than 90% by weight of the uncontrolled organic vapor that would otherwise be emitted into the atmosphere.

(2) All openings in any stationary vessel subject to the provisions of this rule shall be equipped with covers, lids, or seals such that the covers, lids, or seals are in a closed position at all times, except when in actual use.

R 336.1606. Loading gasoline into existing stationary vessels of more than 2,000-gallon capacity at dispensing facilities handling 250,000 or more gallons per year.

Rule 606. (1) After June 30, 1980, it is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any existing stationary vessel of more than 2,000-gallon capacity located at a gasoline dispensing facility in an ozone nonattainment area and having a throughput of 250,000 or more gallons per year, unless such stationary vessel is equipped with a permanent submerged fill pipe.

(2) After June 30, 1981, it is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any existing stationary vessel of more than 2,000-gallon capacity located at a gasoline dispensing facility outside of any ozone nonattainment area and having a throughput of 250,000 or more gallons per year, unless such stationary vessel is equipped with a permanent submerged fill pipe.

(3) After December 31, 1982, it is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any existing stationary vessel of more than 2,000-gallon capacity located at a gasoline dispensing facility in any area listed in table 61 and having a throughput of 250,000 or more gallons per year, unless such stationary vessel is controlled by a vapor balance system or an equivalent control system approved by the commission. The vapor balance system shall capture displaced gasoline vapor and air via a vapor-tight collection line and shall be designed to return not less than 90% by weight of the displaced gasoline vapor from the stationary vessel to the delivery vessel.

(4) Any stationary vessel subject to subrule (3) shall be equipped, maintained, or controlled with both of the following:

(a) An interlocking system or procedure to ensure that the vapor-tight collection line is connected before any gasoline can be loaded.

(b) A device to ensure that the vapor-tight collection line shall close upon disconnection so as to prevent release of gasoline vapor.

(5) Any delivery vessel subject to subrule (3) shall be vapor-tight and shall be filled only at a loading facility that is equipped with a system as required in subrules (3) and (4) of rule 608, subrules (2) and (3) of rule 609, subrules (2) and (3) of rule 705, or subrules (2) and (3) of rule 706.

(6) The provisions of subrules (3) and (4) of this rule shall not apply to a stationary vessel at a gasoline dispensing facility that is served exclusively by gasoline loading facilities exempted by the commission pursuant to subrule (7) of rule 608.

R 336.1607. Loading gasoline into existing stationary vessels of more than 2,000-gallon capacity at loading facilities.

Rule 607. (1) After June 30, 1980, it is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any existing stationary vessel of more than 2,000-gallon capacity located at a gasoline loading facility in an ozone nonattainment area, unless such stationary vessel is equipped with a permanent submerged fill pipe.

(2) After June 30, 1981, it is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any existing stationary vessel of more than 2,000-gallon capacity located at a gasoline loading facility outside of any ozone nonattainment area, unless such stationary vessel is equipped with a permanent submerged fill pipe.

(3) After December 31, 1982, it is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any existing stationary vessel of more than 2,000-gallon capacity located at either of the following loading facilities, unless such stationary vessel is controlled by a vapor balance system or an equivalent control system approved by the commission:

(a) A loading facility located in any area listed in table 61.

(b) A loading facility located in any area not listed in table 61 that delivers gasoline to a gasoline dispensing facility subject to the provisions of subrules (3) and (4) of rule 606 or subrules (2) and (3) of rule 703.

The vapor balance system shall capture displaced gasoline vapor and air via a vapor-tight collection line and shall be designed to return not less than 90% by weight of the displaced gasoline vapor from the stationary vessel to the delivery vessel.

(4) Any stationary vessel subject to subrule (3) shall be equipped, maintained, or controlled with all of the following:

(a) An interlocking system or procedure to ensure that the vapor-tight collection line is connected before any gasoline can be loaded.

(b) A device to ensure that the vapor-tight collection line shall close upon disconnection so as to prevent release of gasoline vapor.

(c) Pressure-vacuum relief valves on aboveground stationary vessels with a minimum pressure valve setting of 8 ounces, if such setting does not exceed the container's maximum pressure rating.

(5) Any delivery vessel subject to subrule (3) shall be vapor-tight.

(6) A person responsible for the operation of all control measures required by this rule shall develop written procedures for the operation of all such control measures, and such procedures shall be posted in an accessible, conspicuous location near the stationary vessel.

R 336.1608. Loading gasoline into existing delivery vessels at loading facilities handling less than 5,000,000 gallons per year.

Rule 608. (1) After June 30, 1980, it is unlawful for a person to load or allow the loading of gasoline from a stationary vessel into any existing delivery vessel located at a gasoline loading facility in an ozone nonattainment area and having a throughput of less than 5,000,000 gallons of gasoline per year, unless such delivery vessel is equipped with a submerged fill pipe.

(2) After June 30, 1981, it is unlawful for a person to load or allow the loading of gasoline from a stationary vessel into any existing delivery vessel located at a gasoline loading facility outside of any ozone nonattainment area and having a throughput of less than 5,000,000 gallons of gasoline per year, unless such delivery vessel is equipped with a submerged fill pipe.

(3) After December 31, 1982, it is unlawful for a person to load or allow the loading of gasoline from a stationary vessel into any existing delivery vessel located at either of the following loading facilities having a throughput of less than 5,000,000 gallons per year, unless such delivery vessel is controlled by a vapor balance system or an equivalent control system approved by the commission:

(a) A loading facility located in any area listed in table 61.

(b) A loading facility located in any area not listed in table 61 that delivers gasoline to a gasoline dispensing facility subject to the provisions of subrules (3) and (4) of rule 606 or subrules (2) and (3) of rule 703.

The vapor balance system shall capture displaced gasoline vapor and air via a vapor-tight collection line and shall be designed to return not less than 90% by weight of the displaced gasoline vapor from the delivery vessel to the stationary vessel.

(4) Any vessel subject to subrule (3) shall be equipped, maintained, or controlled with all of the following:

(a) An interlocking system or procedure to ensure that the vapor-tight collection line is connected before any gasoline can be loaded.

(b) A device to ensure that the vapor-tight collection line shall close upon disconnection so as to prevent release of gasoline vapor.

(c) A device or procedure to accomplish complete drainage before the loading device is disconnected or to prevent liquid drainage from the loading device when not in use.

(d) Pressure-vacuum relief valves that are vapor-tight and set to prevent emission of displaced gasoline vapor during loading of the delivery vessel, except under emergency conditions.

(e) Hatch openings that are kept closed and vapor-tight during loading of the delivery vessel.

(5) Any stationary vessel subject to subrule (3) shall be vapor-tight.

(6) A person responsible for the operation of all control measures required by this rule shall develop written procedures for the operation of all such control measures, and such procedures shall be posted in an accessible, conspicuous location near the loading device.

(7) The provisions of subrule (3) of this rule shall not apply to any gasoline loading facility having a throughput of less than 1,000,000 gallons of gasoline per year.

TABLE 61

List of major metropolitan areas
(Subject to rules 606, 607, 608, 703, 704, and 705)

Metropolitan area	County	Affected area(1)
1) Detroit	Macomb	T3N, R12E, Sections 3-10, 15-22, & 27-34
		T3N, R13E, Sections 25, 35, & 36
		T3N, R14E, Sections 11-14 & 19-32
		T3N, R15E, Sections 7 and 18
		T4N, R12E, Sections 27-34
		Macomb County south of the T2N north township line
	Oakland	T1N, R8E, Sections 1-36
		T1N, R9E, Sections 1-36
		T1N, R10E, Sections 1-36
		T1N, R11E, Sections 1-36
		T2N, R8E, Sections 1-3, 10-16, & 19-36
		T2N, R9E, Sections 1-36
		T2N, R10E, Sections 1-36
		T2N, R11E, Sections 1-36
		T3N, R8E, Sections 13-15, 20-29, & 33-36
		T3N, R9E, Sections 1-36
		T3N, R10E, Sections 2-36
		T3N, R11E, Sections 1-5 & 7-36
		T4N, R9E, Sections 17, 19-22, & 26-36
		T4N, R10E, Sections 1-3, 10-12, 14-16, 20-23, 25-29, & 31-35
		T5N, R10E, Sections 22, 26-29, 34, & 35
	Washtenaw	T2S, R5E, Sections 12-27 & 36
		T2S, R6E, Sections 7-11 & 13-36
		T2S, R7E, Sections 18, 19, & 29-36
		T3S, R6E, Sections 1-6, 8-17, 23, & 24
		T3S, R7E, Sections 1-26
	Wayne	All areas except the following:
		T1S, R8E, Sections 5-8, 17-20, 30, & 31
		T2S, R8E, Sections 5-9, 16-21, & 28-30
		T3S, R8E, Sections 31-35
		T4S, R8E, Sections 2-36
		T4S, R9E, Sections 1-5 & 9-36
		T4S, R10E, Sections 7, 8, 17, & 18

TABLE 61 (continued)

Metropolitan area	County	Affected area(1)
2) Flint	Genesee	T6N, R5E, Sections 1-3
		T6N, R6E, Sections 1-6, 11-14, 24, & 25
		T6N, R7E, Sections 1-2 & 14-25
		T7N, R5E, Sections 34-36
		T7N, R6E, Sections 1-36
		T7N, R7E, Sections 1-36
		T7N, R8E, Sections 3-11, 14-19, 21, 22, and 30
		T8N, R5E, Sections 13-15, 22-27, & 34-36
		T8N, R6E, Sections 1, 2, 11-14, & 19-36
		T8N, R7E, Sections 5-11 & 13-36
		T9N, R6E, Sections 11, 14, 15, 22-27, 35, and 36
		T9N, R7E, Sections 31 & 32
3) Grand Rapids	Kent	T5N, R11W, Sections 4-8, 17, & 18
		T5N, R12W, Sections 1, 12, & 13
		T6N, R10W, Sections 3-10, 15-21, & 28-33
		T6N, R11W, Sections 1-36
		T6N, R12W, Sections 1-36
		T7N, R10W, Sections 28-35
		T7N, R11W, Sections 3-10, 15-23, & 25-36
		T7N, R12W, Sections 1-36
		T8N, R11W, Sections 13-16, 19-23, & 26-34
	Ottawa	T5N, R13W, Sections 4 & 5
		T6N, R13W, Sections 9-16, 21-29, 32, & 33
4) Lansing	Clinton	T5N, R2W, Sections 4, 5, 7-9, 15-18, 20-23, 26-29, & 31-35
		T5N, R3W, Sections 33-36
	Eaton	T3N, R3W, Sections 1-3 & 9-12
		T4N, R3W, Sections 1-4, 9-16, 20-26, 35, and 36
	Ingham	T3N, R2W, Sections 1-12, 14-16, 22, & 23
		T4N, R1W, Sections 2-11, 14-23, 26--29, & 33
		T4N, R2W, Sections 1-36

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(1) Maps of affected areas may be reviewed and inspected at the Lansing office of the air quality division of the department of natural resources.

R 336.1609. Loading existing delivery vessels with organic compounds having a true vapor pressure of more than 1.5 psia at loading facilities handling 5,000,000 or more gallons of such compounds per year.

Rule 609. (1) After June 30, 1981, it is unlawful for a person to load or allow the loading of any organic compound having a true vapor pressure of more than 1.5 psia at actual conditions from any stationary vessel into any existing delivery vessel located at a loading facility outside an ozone nonattainment area and having a throughput of 5,000,000 or more gallons of such compounds per year, unless such delivery vessel is equipped with a submerged fill pipe.

(2) After December 31, 1982, it is unlawful for a person to load or allow the loading of any organic compound having a true vapor pressure of more than 1.5 psia at actual conditions from any stationary vessel into any existing delivery vessel located at a loading facility in an ozone nonattainment area and having a throughput of 5,000,000 or more gallons of such compounds per year, unless such delivery vessel is controlled by a vapor recovery system that captures all displaced organic vapor and air via a vapor-tight collection line and recovers the organic vapor such that emissions to the atmosphere do not exceed 0.7 pounds of organic vapor per 1,000 gallons of organic compounds loaded.

(3) Any delivery vessel subject to subrule (2) shall be equipped, maintained, or controlled with all of the following:

(a) An interlocking system or procedure to ensure that the vapor-tight collection line is connected before any organic compound can be loaded.

(b) A device to ensure that the vapor-tight collection line shall close upon disconnection so as to prevent release of organic vapor.

(c) A device to accomplish complete drainage before the loading device is disconnected, or a device to prevent liquid drainage from the loading device when not in use.

(d) Pressure-vacuum relief valves that are vapor-tight and set to prevent emission of displaced organic vapor during loading of the delivery vessel, except under emergency conditions.

(e) Hatch openings that are kept closed and vapor-tight during loading of the delivery vessel.

(4) A person responsible for the operation of all control measures required by this rule shall develop written procedures for the operation of all such control measures, and such procedures shall be posted in an accessible, conspicuous location near the loading device.

(5) The provisions of subrule (2) shall not apply to the loading of crude oil or condensate into delivery vessels at production facilities, if such loading is accomplished with a submerged fill pipe after June 30, 1981.

R 336.1610. Existing coating lines.

Rule 610. (1) For the purpose of this rule:

(a) "Volatile organic compound" means any organic compound as determined by the use of either of the following procedures:

(i) The volatile content of organic solvent-type paints as measured by the standard test method set forth in ASTM-D 2369-73.

(ii) The volatile content of water-reducible paints as measured by a method approved by the commission.

(b) "Coating transfer efficiency" means the percentage of coating solids material that leaves the coating applicator and remains on the surface of the product.

(2) It is unlawful for a person to cause or allow the emission of volatile organic compounds from the coating of automobiles and light-duty trucks, from any existing coating line, in excess of the equivalent emission rates as shown in table 62.

(3) It is unlawful for a person to cause or allow the emission of volatile organic compounds from the coating of cans, coils, large appliances, metal furniture, magnet wire, or the nonmetallic surfaces of fabrics, vinyl, or paper, from any existing coating line, in excess of the equivalent emission rates as shown in table 63.

(4) Equivalent emission rates and coating transfer efficiencies shall be determined by procedures acceptable to the commission.

(5) The provisions of this rule shall not apply to either of the following:

(a) Coating lines within 1 geographical site which have a combined emission rate of less than 100 pounds per day or 2,000 pounds per month.

(b) The operation of a natural gas-fired afterburner during the period between November 1 and March 31, if discontinued use of such afterburner during this period will not result in a violation of any other administrative rules of the commission.

TABLE 62

Volatile organic compound emissions for automobile and light-duty truck coating lines

Page 1 of 2

Plant	Process	Allowable emission rate pounds per gallon [1,2]							On and after
		Dec. 31 1979	Dec. 31 1980	Dec. 31 1981	Dec. 31 1982	Dec. 31 1983	Dec. 31 1984	Dec. 31 1985	Dec. 31 1986
General Motors Corporation									
1) Buick Motors Division	Prime	5.4	5.4	1.2	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	N.A.[3]	N.A.	N.A.	N.A.	N.A.	N.A.	2.8	2.8
	Topcoat	5.8	5.8	5.8	5.0	5.0	5.0	2.8	2.8
	Repair	6.5	6.5	6.5	6.5	6.5	6.5	4.8	4.8
2) Cadillac Motors Division	Prime	5.5	5.5	5.5	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	6.1	6.1	6.1	3.0	2.8	2.8	2.8	2.8
	Topcoat	5.8	5.8	5.0	5.0	2.8	2.8	2.8	2.8
	Repair	6.5	6.5	6.5	6.5	4.8	4.8	4.8	4.8
3) Fleetwood Fisher Body	Prime	2.2	2.2	2.2	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	6.1	3.0	3.0	3.0	2.8	2.8	2.8	2.8
	Topcoat	5.8	5.8	5.0	5.0	2.8	2.8	2.8	2.8
	Repair	6.5	6.5	6.5	6.5	4.8	4.8	4.8	4.8
4) Fisher Body Detroit Central #21	Prime	6.7	6.7	6.7	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	6.1	6.1	6.1	3.0	2.8	2.8	2.8	2.8
	Topcoat	6.5	6.5	6.5	5.0	2.8	2.8	2.8	2.8
	Repair	6.5	6.5	6.5	6.5	4.8	4.8	4.8	4.8
5) Flint--North & South	Prime	6.7	6.7	1.2	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	6.1	6.1	3.0	3.0	3.0	3.0	2.8	2.8
	Topcoat	5.8	5.8	5.8	5.0	5.0	5.0	2.8	2.8
	Repair	6.5	6.5	6.5	6.5	6.5	6.5	4.8	4.8
6) Flint Truck #1 (body)	Prime	6.7	6.7	1.2	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	N.A.	N.A.	N.A.	N.A.	2.8	2.8	2.8	2.8
	Topcoat	4.8	4.8	4.8	3.6	2.8	2.8	2.8	2.8
	Repair	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
7) Flint Truck #2 (body)	Prime	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	6.1	6.1	6.1	6.1	2.8	2.8	2.8	2.8
	Topcoat	4.8	4.8	3.6	3.6	2.8	2.8	2.8	2.8
	Repair	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
8) Flint Truck #1 (sheet metal)	Prime	5.4	5.4	5.4	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	Topcoat	4.8	4.8	4.8	3.6	2.8	2.8	2.8	2.8
	Repair	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
9) Flint Truck #2 (sheet metal)	Prime	5.4	5.4	5.4	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	Topcoat	4.8	4.8	3.6	3.6	2.8	2.8	2.8	2.8
	Repair	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
10) GMC #3	Prime	2.2	2.2	2.2	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	2.8	2.8
	Topcoat	4.8	4.8	3.6	3.6	3.6	3.6	2.8	2.8
	Repair	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
11) Lansing Fisher Body	Prime	2.2	2.2	2.2	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.8
	Topcoat	5.8	5.8	5.0	5.0	5.0	5.0	5.0	2.8
	Repair	6.5	6.5	6.5	6.5	6.5	6.5	6.5	4.8
12) Pontiac Fisher Body	Prime	6.7	6.7	6.7	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	6.1	6.1	6.1	3.0	3.0	2.8	2.8	2.8
	Topcoat	5.8	5.8	5.0	5.0	5.0	2.8	2.8	2.8
	Repair	6.5	6.5	6.5	6.5	6.5	4.8	4.8	4.8
13) Pontiac Motors Division	Prime	2.2	2.2	2.2	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	N.A.	N.A.	N.A.	N.A.	N.A.	2.8	2.8	2.8
	Topcoat	5.8	5.8	5.0	5.0	5.0	2.8	2.8	2.8
	Repair	6.5	6.5	6.5	6.5	6.5	4.8	4.8	4.8
14) Oldsmobile	Prime	5.4	5.4	5.4	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	2.8
	Topcoat	5.8	5.8	5.0	5.0	5.0	5.0	5.0	2.8
	Repair	6.5	6.5	6.5	6.5	6.5	6.5	6.5	4.8
15) Willow Run	Prime	2.2	2.2	2.2	1.2	1.2	1.2	1.2	1.2
	Prime Surf.	6.1	3.0	3.0	2.8	2.8	2.8	2.8	2.8
	Topcoat	5.8	5.8	5.8	2.8	2.8	2.8	2.8	2.8
	Repair	6.5	6.5	6.5	4.8	4.8	4.8	4.8	4.8

TABLE 62 Continued

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Plant	Process	Allowable emission rate, pounds per gallon[1, 2] Dec. 31 1979	Dec. 31 1980	Dec. 31 1981	Dec. 31 1982	Dec. 31 1983	Dec. 31 1984	Dec. 31 1985	On and after Dec. 31 1986
Ford Motor Company									
16) Michigan Truck	Prime	2.0	2.0	2.0	1.2	1.2	1.2	1.2	1.2
	Prime Surf.[4]	4.8	4.8	4.8	3.2	3.2	3.2	3.2	3.2
	Topcoat[5]	5.1	4.8	4.8	4.8	4.8	3.5	3.6	3.6
	Repair	5.1	4.8	4.8	4.8	4.8	4.8	4.8	4.8
17) Dearborn Assembly	Prime	2.0	2.0	2.0	1.2	1.2	1.2	1.2	1.2
	Prime Surf.[4]	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2
	Topcoat[5]	5.1	5.1	4.8	4.8	4.3	3.6	3.6	3.5
	Repair	5.1	5.1	4.8	4.8	4.8	4.8	4.8	4.8
18) Wayne Assembly	Prime	2.0	2.0	2.0	1.2	1.2	1.2	1.2	1.2
	Prime Surf.[4]	4.8	4.8	4.8	4.3	4.8	3.2	3.2	3.2
	Topcoat[5]	5.1	5.1	5.1	4.8	4.8	4.8	4.8	3.6
	Repair	5.1	5.1	5.1	4.8	4.8	4.3	4.8	4.8
19) Wixom Assembly	Prime	2.0	2.0	2.0	1.2	1.2	1.2	1.2	1.2
	Prime Surf.[4]	4.8	4.8	4.8	4.8	4.3	3.2	3.2	3.2
	Topcoat[5]	5.1	5.1	5.1	4.8	4.8	4.3	4.3	3.6
	Repair	5.1	5.1	5.1	4.8	4.8	4.8	4.8	4.8
Chrysler Corporation									
20) Lynch Road	Prime[6]	4.3	4.3	4.3	4.3	4.3	4.3	4.3	1.2
	Prime Surf.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	2.8
	Topcoat[7]	4.8	4.8	4.8	4.8	4.8	3.6	3.6	3.6
	Repair	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
21) Jefferson Truck	Prime[6]	4.8	4.8	4.8	4.8	4.8	4.8	4.8	1.2
	Prime Surf.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	2.8
	Topcoat[7]	4.8	4.8	4.8	4.8	4.8	3.6	3.6	3.6
	Repair	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
22) Hamtramck	Prime[6]	4.3	4.3	4.3	4.3	1.2	1.2	1.2	1.2
	Prime Surf.	N.A.	N.A.	N.A.	N.A.	2.8	2.8	2.8	2.8
	Topcoat[7]	4.8	4.8	4.8	4.8	4.8	3.6	3.6	3.6
	Repair	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
23) Warren Main	Prime[6]	4.8	4.8	4.8	4.8	1.2	1.2	1.2	1.2
	Prime Surf.	N.A.	N.A.	N.A.	N.A.	2.8	2.8	2.8	2.8
	Topcoat[7]	4.8	4.8	4.8	4.8	4.8	3.6	3.6	3.6
	Repair	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
24) Warren Compact	Prime	4.8	4.8	4.8	4.8	4.8	1.2	1.2	1.2
	Prime Surf.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	Topcoat	4.8	4.8	4.8	4.8	4.8	3.6	3.6	3.5
	Repair	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
25) Checker Motors	Prime	5.1	5.1	5.1	2.9	2.9	2.9	2.9	2.9
	Prime Surf.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	Topcoat	4.7	4.7	4.7	4.7	4.7	4.7	3.6	3.6
	Repair	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
26) Other Plants	Prime				1.2	1.2	1.2	1.2	1.2
	Prime Surf.				2.8	2.8	2.8	2.8	2.8
	Topcoat				2.8	2.8	2.8	2.8	2.8
	Repair				4.8	4.8	4.8	4.8	4.8

Footnotes:

[1] Pounds of volatile organic compounds emitted per gallon of coating (minus water) as applied. Prime , prime surfacer, and repair limits represent maximum values. Limits for topcoats represent an instantaneous average volatile organic compound content of all coatings which are being supplied to the spray booth.

[2] Topcoat limit of 2.8 pounds VOC per gallon assume baseline values of water base paint with 25% solids, 15% solvent, and 60% water by volume and 40% coating transfer efficiency.

[3] N.A. = Not applicable.

[4] Limit of 3.2 also requires electrostatic spraying or other coating technique to provide a minimum coating transfer efficiency of 53%.

[5] At Wayne assembly and Wixom assembly, topcoat to be electrostatically sprayed or applied with another technique to provide a minimum transfer efficiency of 60% on and after December 31, 1982, and 65% on and after December 31, 1986. At Michigan truck and Dearborn assembly, topcoat to be electrostatically sprayed or applied with another technique to provide a minimum transfer efficiency of 65% on and after December 31, 1984.

[6] Chrysler's limits for prime is the average of water base dip and spray primer. Spray primer is to be electrostatically sprayed or applied with another technique to provide a minimum coating transfer efficiency of 55% on and after December 31, 1979.

[7] Chrysler topcoats to be electrostatically sprayed or applied with another technique to provide a minimum coating transfer efficiency of 55% on and after December 31, 1979, and 65% on and after December 31, 1981 for Jefferson truck; December 31, 1982 for Lynch road; December 31, 1983 for Hamtramck and Warren Main; and December 31, 1984 for Warren compact.

TABLE 63

Volatile organic compound emissions for existing coating lines excluding automobiles and light-duty trucks

Coating line	Allowable emission rate pounds per gallon[1] On and after December 31, 1982	
	Average[2]	Maximum
A. Metallic surfaces		
1. Coating of cans		
(a) Sheet basecoat (exterior & interior) and overvarnish; 2-piece can exterior (basecoat & overvanish)	2.8	2.9
(b) Two- and 3-piece can interior body spray; 2-piece can interior end (spray or roll coat)	4.2	4.6
(c) Three-piece can side-seam spray	5.5	5.8
(d) End sealing compound	4.2[3]	4.4
2. Coating of coils	2.6	2.6
3. Coating of large appliances[4]	2.8	2.9
4. Coating of metal furniture[4]	3.0	3.2
5. Insulation of magnet wire	1.7	1.7
B. Nonmetallic surfaces		
1. Coating of fabric	2.9	2.9
2. Coating of vinyl	4.5	4.5
3. Coating of paper	2.9	2.9

[1] Pounds of volatile organic compounds emitted per gallon of coating (minus water) as applied.

[2] Average of all gallons applied during any 24-hour period. Any person responsible for the operation of any coating line listed in this table shall, upon request by the commission, keep records of product process rates, application rates of each type of coating, and other parameters necessary for determination of the daily weighted average VOC emission rate per gallon.

[3] The limit of 4.2 pounds shall become 3.7 on and after December 31, 1985.

[4] The applicable limits shall not apply to coatings used for the repair of scratches and nicks.

R 336.1611. Existing cold cleaners.

Rule 611. (1) After June 30, 1980, it is unlawful for a person to operate an existing cold cleaner unless all of the provisions of the following subrules are met or unless an equivalent control method is approved by the commission.

(2) It is unlawful for a person to operate an existing cold cleaner unless all of the following conditions are met:

(a) A cover shall be installed and shall be closed whenever parts are not being handled in the cleaner.

(b) A device shall be available for draining cleaned parts, and the parts shall be drained not less than 15 seconds or until dripping ceases.

(c) Waste organic solvent shall be stored only in closed containers, unless demonstrated to be a safety hazard and disposed of in a manner such that not more than 20% by weight is allowed to evaporate into the atmosphere.

(3) A person responsible for the provisions of this rule shall develop written procedures for the operation of such provisions, and such procedures shall be posted in an accessible, conspicuous location near the cold cleaner.

(4) The provisions of this rule shall not apply to any existing cold cleaner having an air/vapor interface of less than 4 square feet.

R 336.1612. Existing open top vapor degreasers.

Rule 612. (1) After June 30, 1980, it is unlawful for a person to operate an existing open top vapor degreaser unless all of the provisions of the following subrules are met or unless an equivalent control method is approved by the commission.

(2) It is unlawful for a person to operate an existing open top vapor degreaser unless all of the following conditions are met:

(a) A cover shall be installed that is designed to be opened and closed easily without disturbing the vapor zone. The cover shall be closed at all times, except when processing workloads through the degreaser.

(b) A procedure shall be developed to minimize organic solvent carryout by doing all of the following:

(i) Racking parts to allow complete drainage.

(ii) Moving parts in and out of the degreaser at a vertical speed of less than 11 feet per minute when a powered hoist is used to raise or lower the parts.

(iii) Holding parts in the vapor zone not less than 30 seconds or until condensation ceases.

(iv) Tipping or tumbling parts in a manner such that no pools of organic solvent remain on the cleaned parts before removal.

(v) Allowing parts to dry within the degreaser for not less than 15 seconds or until visually dry.

(c) Total workload shall not occupy more than 1/2 of the degreaser's open top area.

(d) Organic solvent shall not be sprayed above the vapor level.

(e) Organic solvent leaks shall be repaired immediately.

(f) The degreaser shall be operated in a manner such that no water is visibly detectable in solvent exiting the water separator.

(g) Exhaust ventilation shall not exceed 65 cubic feet per minute per square foot of degreaser open area, unless necessary to meet OSHA requirements.

(h) Waste organic solvent shall be stored only in closed containers, unless demonstrated to be a safety hazard and disposed of in a manner such that not more than 20% by weight is allowed to evaporate into the atmosphere.

(3) A person responsible for the provisions of this rule shall develop written procedures for the operation of all such provisions, and such procedures shall be posted in an accessible, conspicuous location near the vapor degreaser.

(4) The provisions of this rule shall not apply to any existing open top vapor degreaser having an air/vapor interface of less than 4 square feet.

R 336.1613. Existing conveyorized cold cleaners.

Rule 613. (1) After June 30, 1980, it is unlawful for a person to operate an existing conveyorized cold cleaner unless all of the provisions of the following subrules are met or unless an equivalent control method is approved by the commission.

(2) It is unlawful for a person to operate an existing conveyorized cold cleaner unless all of the following conditions are met:

(a) A procedure shall be developed to minimize organic solvent carryout by doing both of the following:

(i) Racking parts for best drainage.

(ii) Maintaining the conveyor speed at a level that shall prevent dripping of solvent off the cleaned parts.

(b) Organic solvent leaks shall be repaired immediately.

(c) The cleaner shall be operated in a manner such that no water is visibly detectable in solvent exiting the water separator.

(d) Waste organic solvent shall be stored only in closed containers, unless demonstrated to be a safety hazard and disposed of in a manner such that not more than 20% by weight is allowed to evaporate into the atmosphere.

(3) A person responsible for the provisions of this rule shall develop written procedures for the operation of all such provisions, and such procedures shall be posted in an accessible, conspicuous location near the cold cleaner.

R 336.1614. Existing conveyorized vapor degreasers.

Rule 614. (1) After June 30, 1980, it is unlawful for a person to operate an existing conveyorized vapor degreaser unless all of the provisions of the following subrules are met or unless an equivalent control method is approved by the commission.

(2) It is unlawful for a person to operate an existing coveyorized vapor degreaser unless all of the following conditions are met:

(a) A procedure shall be developed to minimize organic solvent carryout by doing both of the following:

(i) Racking parts for best drainage.

(ii) Maintaining the vertical conveyor speed at less than 11 feet per minute.

(b) Organic solvent leaks shall be repaired immediately.

(c) The degreaser shall be operated in a manner such that no water is visibly detectable in solvent exiting the water separator.

(d) Exhaust ventilation shall not exceed 65 cubic feet per minute per square foot of degreaser open area, unless necessary to meet OSHA requirements.

(e) Waste organic solvent shall be stored only in closed containers, unless demonstrated to be a safety hazard and disposed of in a manner such that not more than 20% by weight is allowed to evaporate into the atmosphere.

(3) A person responsible for the provisions of this rule shall develop written procedures for the operation of all such provisions, and such procedures shall be posted in an accessible, conspicuous location near the vapor degreaser.

R 336.1615. Existing vacuum-producing systems at petroleum refineries.

Rule 615. After December 31, 1979, it is unlawful for a person to cause or allow the emission of any volatile organic compound from the condensers, hot wells, or accumulators of any existing vacuum-producing system at a petroleum refinery, unless such emission is controlled by 1 of the following methods:

(a) Capture and disposal in a fuel gas system.
(b) Combustion in a smokeless flare.
(c) Any method approved by the commission that recovers not less than 90% by weight of the uncontrolled volatile organic compound emissions that would otherwise be emitted into the atmosphere.

R 336.1616. Process unit turnarounds at petroleum refineries.

Rule 616. (1) After December 31, 1979, it is unlawful for a person to cause or allow the emission of any volatile organic compound from any process unit turnaround at any petroleum refinery, unless such emission is controlled by 1 of the following methods:

(a) Capture and disposal in a fuel gas system.
(b) Combustion in a smokeless flare.
(c) Any method approved by the commission that recovers not less than 90% by weight of the uncontrolled volatile organic compounds that would otherwise be emitted into the atmosphere.

(2) The provisions of this rule shall apply until the pressure of all vessels in the system is less than 5 psi gauge.

(3) The commission shall be notified not less than 30 days prior to any process unit turnaround subject to the provisions of this rule.

R 336.1617. Existing organic compound-water separators at petroleum refineries.

Rule 617. (1) After December 31, 1980, it is unlawful for a person to operate any existing organic compound-water separator at a refinery unless all separator compartments and all forebays are equipped with a solid cover with all openings sealed and totally enclosing the liquid contents or unless an equivalent method is approved by the commission.

(2) All openings in covers, separators, and forebays of any organic compound-water separator subject to the provisions of subrule (1) shall be equipped with lids or seals such that the lids or seals are in the closed position at all times, except when in actual use.

R 336.1618. Use of cutback paving asphalt.

Rule 618. After December 31, 1982, it is unlawful for a person to manufacture, mix, store, use, or apply cutback paving asphalts from May 1 to September 30, unless prior approval is given by the commission. In granting such authorizations, the commission shall consider both of the following:

(a) The need for long-life stockpile storage.
(b) Use of such cutback paving asphalt solely as a penetrating prime coat.

R 336.45. Opening Burning.

Rule 45. (1) No person shall cause or permit open burning except where permitted in accordance with Act No. 87 of the Public Acts of 1965, being sections 325.291 to 325.298 of the Compiled Laws of 1948, or rules promulgated thereunder, or where permitted in accordance with Act No. 143 of the Public Acts of 1923, as amended, and Act No. 35 of 1955, being sections 320.1 to 320.48 of the Compiled Laws of 1948.

(2) No person shall conduct a salvage operation by open burning except on written approval of the commission. The commission shall seek advice and guidance of local authorities before issueing such approval.

PART 9. EMISSION LIMITATIONS AND PROHIBITIONS--MISCELLANEOUS

R 336.1901. Air contaminant or water vapor, when prohibited.

Rule 901. Notwithstanding the provisions of any other commission rule, a person shall not cause or permit the emission of an air contaminant or water vapor in quantities that cause, alone or in reaction with other air contaminants, either of the follwing:

(a) Injurious effects to human health or safety, animal life, plant life of significant economic value, or property.

(b) Unreasonable interference with the comfortable enjoyment of life and property.

R 336.1906. Diluting and concealing emissions.

Rule 906. Unless prior written approval is obtained from the commission, no person shall build, erect, install, or use any article, machine, equipment, or other contrivance if the sole purpose of the article, machine, equipment, or other contrivance is to dilute or conceal an emission without resulting in a reduction in the total release of air contaminants into the atmosphere. This rule does not apply to the control of odors.

R 336.1910. Air-cleaning devices.

Rule 910. An air-cleaning device shall be installed, maintained, and operated in a satisfactory manner and in accordance with these rules and existing law.

R 336.1911. Malfunction abatement plans.

Rule 911. (1) Upon request of the commission, a person responsible for the operation of a source of an air contaminant shall prepare a malfunction abatement plan to prevent, detect, and correct malfunctions or equipment failures resulting in emissions exceeding any applicable emission limitation.

(2) A malfunction abatement plan required by subrule (1) shall be in writing and shall, at a minimum, specify all of the following:

(a) A complete preventative maintenance program, including identification of the supervisory personnel responsible for overseeing the inspection, maintenance and repair of air-cleaning devices, a description of the items or conditions that shall be inspected, the frequency of these inspections or repairs, and an identification of the major replacement parts that shall be maintained in inventory for quick replacement.

(b) An identification of the source and air-cleaning device operating variables that shall be monitored to detect a malfunction or failure, the normal operating range of these variables, and a description of the method of monitoring or surveillance procedures.

(c) A description of the corrective procedures or operational changes that shall be taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits.

(3) A malfunction abatement plan required by subrule (1) shall be submitted to the commission and shall be subject to review and approval by the commission. If, in the opinion of the commission, the plan does not adequately carry out the objectives as set forth in subrules (1) and (2), the commission may disapprove the plan, state its reasons for disapproval, and order the preparation of an amended plan within the time period specified in the order. If, within the time period specified in the order, an amended plan is submitted which, in the opinion of the commission, fails to meet the objective, the commission, on its own initiative, may amend the plan to cause it to meet the objective.

(4) Within 180 days after the commission approves a malfunction abatement plan, a person responsible for the preparation of a malfunction abatement plan shall implement the malfunction abatement plan required by subrule (1).

R 336.1912. Abnormal conditions and breakdown of equipment.

Rule 912. The owner or operator of a source of emissions exceeding any applicable emission limit as a direct result of abnormal conditions in, or breakdown of, process or control equipment continuing for more than 2 hours shall do both of the following:

(a) Notify the commission or the air quality division as soon as is reasonably possible.

(b) Submit to the commission, in writing, within 10 days, a detailed report, including probable causes, duration of violation, remedial action taken, and what steps are being undertaken to prevent a reoccurrence. These preventative steps shall become a part of any malfunction abatement plan required by rule 911.

R 336.1930. Emission of carbon monoxide from ferrous cupola operations.

Rule 930. (1) After December 31, 1982, it is unlawful for a person to operate a ferrous cupola with a melting capacity of 20 or more tons per hour located within any area listed in table 91, unless the ferrous cupola is equipped with an afterburner control system, or equivalent, which reduces the carbon monoxide emissions from the ferrous cupola by 90%.

(2) The emission rate of carbon monoxide from a ferrous cupola shall be determined by using reference test method 10, unless otherwise specified by the commission.

(3) A person responsible for the operation of a ferrous cupola subject to the provisions of this rule shall submit to the commission, within 6 months after the effective date of this rule, a written program, acceptable to the commission, for compliance with this rule or evidence of compliance with this rule. Such evidence shall include available data, control equipment specifications, or other information that demonstrates compliance. The required control program shall demonstrate that compliance shall be achieved as expeditiously as practical.

(4) The program required by subrule (3) shall include the method by which compliance with this rule shall be achieved, a complete description of new equipment to be installed, modifications to existing equipment to be made, and a timetable which specifies, at a minimum, the following dates:

(a) The date equipment shall be ordered.

(b) The date construction or modification of equipment shall begin.

(c) The date initial start-up of equipment shall begin.

(d) The date final compliance shall be achieved, if not the same as the date specified in subdivision (c).

TABLE 91
Areas subject to rule 930

County	Area
Saginaw	T12N, R4E, Sections 1, 12, 13, and 24; T12N, R5E, Sections 4, 9, and 16-21.
Macomb, Oakland, and Wayne	Area included within the following (counterclockwise): Lake St. Clair to 14 Mile Road to Kelly Road north to 15 Mile Road to Hayes Road south to 14 Mile Road to Clawson city boundary, following north Clawson city boundary to north Royal Oak city boundary to 13 Mile Road to Evergreen Road to southern Beverly Hills city boundary to southern Bingham Farms city boundary to southern Franklin city boundary to Inkster Road to 8 Mile Road to western Livonia city boundary to western Westland city boundary to western Wayne city boundary to western and to southern Romulus city boundary including Pennsylvania Road extended to Detroit River.

PART 10. INTERMITTENT TESTING AND SAMPLING

R 336.2001. Performance tests by owner.

Rule 1001. (1) The commission may require the owner or operator of any source of air contaminant to conduct acceptable performance tests, at the owner's or operator's expense, in accordance with rule 1003 under any 1 of the following conditions:

(a) Prior to issuance of a permit to operate.

(b) The source is determined to be in violation of rule 301 and the potential emissions exceed 100 tons per year.

(c) The owner or operator of the source has not submitted an acceptable performance test, in accordance with rule 1003, that demonstrates that the source is in compliance with the commission's rules and with the conditions specified in the permit to install.

(d) The source of air contaminant is located in an area designated as nonattainment for 1 or more air pollutants, and more than 12 months have expired since the date of the last performance test for such designated nonattainment pollutants.

(e) The source of air contaminant has potential emissions in excess of 100 tons per year, is located in an area designated as attainment for 1 or more air pollutants, and more than 36 months have expired since the date of the last performance test for such designated attainment pollutants.

(f) After completion of a compliance program.

(2) Performance tests required by subrule (1) shall be conducted within 60 days following receipt of written notification from the commission, unless otherwise authorized by the commission.

(3) Not less than 7 days before performance tests are conducted, the owner of a source of air contaminant, or his authorized agent, shall notify the commission, in writing, of the time and place of the performance tests and who shall conduct them. A representative of the commission shall have the opportunity to witness these tests.

(4) Results of performance tests shall be submitted to the commission in the format prescribed by the applicable reference test method within 60 days following the last date of the test.

R 336.2002. Performance tests by commission.

Rule 1002. (1) The commission may conduct performance tests in accordance with rule 1003 at any source of air contaminant, on behalf of the state, at a reasonable time and at the state's expense. During the conduct of such tests, the commission may obtain samples of any air contaminant and samples of any material entering or exiting the source or air-cleaning device for the purpose of evaluating pollutant emissions with respect to process operating conditions.

(2) The commission shall provide written notification to the owner or operator of a source of the commission's intent to conduct performance tests pursuant to subrule (1). Within 30 days of receipt of such notification, the owner or operator shall provide, and bear the expense of, performance test facilities as specified by the commission, including the following:

(a) Sampling ports adequate for reference test methods applicable to the source.

(b) Safe sampling platforms as required.

(c) Safe access to sampling platforms.

(d) A suitable power source within 50 feet of any sampling location designated by the commission.

Upon request, additional time for installing the required performance test facilities may be authorized by the commission for special situations.

(3) The owner shall not be responsible for providing sampling instruments and sensing devices.

(4) Results of performance tests shall be furnished to the owner or operator, or both, in the format prescribed by the applicable reference test method within 60 days following the last date of the test.

R 336.2003. Performance test criteria.

Rule 1003. (1) Performance tests shall be conducted and data reduced according to the reference test methods as published in appendix A to the commission's rules, unless the commission does any of the following:

(a) Specifies or approves, in specific cases, the use of a reference test method with minor changes in procedures or equipment.

(b) Approves the use of an equivalent method.

(c) Specifies or approves the use of an alternative method if an applicable reference test method does not exist for a specific air contaminant or source of air contaminant.

(2) A performance test shall consist of a minimum of 3 separate samples of a specific air contaminant conducted within a 36-hour period, unless otherwise authorized by the commission. Each of the 3 separate samples shall be obtained while the source is operating at a similar production level. For the purpose of determining compliance with an applicable emission limit, rule, or permit condition, the arithmetic mean of results of the 3 samples shall apply. If a sample is accidentally lost or conditions occur in which 1 of the 3 samples must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sampling train, extreme meteorological conditions, or other circumstances beyond the owner's or operator's control, compliance may, upon the approval of the commission, be determined using the arithmetic mean of the results of 2 samples.

(3) All performance tests shall be conducted while the source of air contaminant is operating at maximum routine operating conditions, or under such other conditions, within the capacity of the equipment, as may be requested by the commission. Other conditions may include source operating periods of start-up, shutdown, or such other operations, excluding malfunction, specific to certain sources. Routine operating conditions shall also include those specified within a permit to install or a permit to operate. The owner or operator shall make available to the commission such records as may be necessary to determine the conditions of source operation that occurred during the period of time of the performance test.

(4) For any source that is subject to an emission limitation calculated to 50% excess air, the multipoint, integrated sampling procedure of method 3 shall be used for gas analysis. For all other sources that require a determination of the molecular weight of the exhaust, any optional sampling procedure of method 3 may be used. Alternatives or modifications to procedures are subject to the approval of the commission.

(5) For reference test methods 5A, 5B, and 5C, the minimum volume per sample shall be 30 cubic feet of dry gas corrected to standard conditions (70 degrees Fahrenheit, 29.92 in. Hg.). Minimum sample time shall be 60 minutes, which may be continuous or a combination of shorter sampling periods for sources that operate in a cyclic manner. Smaller sampling

times, or sample volumes, when necessitated by process variables or other factors, may be approved by the commission.

R 336.2004. Appendix A; reference test methods.

Rule 1004. (1) The following federal reference test methods, described in appendix A to 40 C.F.R. part 60 (July 1, 1978), are the reference test methods for performance tests required under part 10 of the commission's rules as follows:

(a) Method 1 - Sample and velocity traverse for stationary sources.

(b) Method 2 - Determination of stack gas velocity and volumetric flow rate (type-S pitot tube).

(c) Method 3 - Gas analysis for carbon dioxide, oxygen, excess air, and dry molecular weight.

(d) Method 4 - Determination of moisture content in stack gases.

(e) Method 6 - Determination of sulfur dioxide emissions from stationary sources.

(f) Method 7 - Determination of nitrogen oxide emissions from stationary sources.

(g) Method 8 - Determination of sulfuric acid mist and sulfur dioxide emissions from stationary sources.

(h) Method 10 - Determination of carbon monoxide emissions from stationary sources.

The above reference test methods are herein adopted by reference. Copies of the test methods may be inspected at the Lansing office of the air quality division of the department of natural resources. A copy of title 40 of the Code of Federal Regulations, parts 60-99, may be obtained from the Department of Natural Resources, P.O. Box 30028, Lansing, Michigan 48909, at a cost of $8.50. A copy may also be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, at a cost of $8.50.

(2) All alternatives subject to the approval of the administrator in the adopted federal reference methods are subject to the approval of the commission.

(3) The determination of particulate emissions from stationary sources shall be conducted by using 1 or more of the following reference test methods:

(a) Method 5A - Impinger filtration method. Method 5A reads as follows:

(i) Principle and applicability.

(A) Principle. Particulate matter is withdrawn isokinetically from the source and collected on liquid impingment and dry filter-type media. The particulate matter mass is determined gravimetrically after removal of uncombined water.

(B) Applicability. This method is applicable for the determination of particulate emissions from stationary sources as specifically provided for in the commission's rules, a permit to install, or a permit to operate.

(ii) Apparatus.

(A) Sampling train. A schematic of the sampling train used in this method is shown in figure 101. Construction details for many, but not all, of the train components are given in APTD-0581 (paragraph (vii)(B) of this method). For changes from the APTD-0581 document and for allowable modifications to figure 101, consult with the commission.

The operating and maintenance procedures for many, but not all, of the sampling train components are described in APTD-0576 (paragraph (vii)(C) of this method). Since correct usage is important in obtaining valid results, all users shall read APTD-0576 and adopt the applicable operating and maintenance procedures outlined in it, unless otherwise specified herein. The sampling train consists of the following components.

APTD-0576 and APTD-0581 are herein adopted by reference. Copies of these documents may be inspected at the Lansing office of the air quality division of the department of natural resources. Copies of these documents may be obtained from the Department of Natural Resources, P.O. Box 30028, Lansing, Michigan 48909, at a cost of $4.50 each. Copies may also be obtained from the National Technical Information Services, 5285 Port Royal Road, Springfield, Virginia 22161, at a cost of $4.50 each.

(1) Probe nozzle. Stainless steel (316) or glass with sharp, tapered leading edge. The angle of taper shall be less than 30 degrees and the taper shall be on the outside to preserve a constant internal diameter. The probe nozzle shall be of the button-hook design, unless otherwise specified by the commission. If made of stainless steel, the nozzle shall be constructed from seamless tubing. Other materials of construction may be used, subject to the approval of the commission.

A range of nozzle sizes suitable for isokinetic sampling shall be available, e.g., 0.32 to 1.27 cm. (1/8 to 1/2 in. - or larger if higher volume sampling trains are used - inside diameter (ID) nozzles in increments of 0.16 cm. (1/16 in). Each nozzle shall be calibrated according to the procedures outlined in paragraph (v) of this method.

(2) Probe liner. Interior surface may be constructed of teflon or glass (borosilicate or quartz). Stainless steel or other corrosion-resistant metals may be used, subject to the approval of the commission.

Teflon may be used for stack temperatures up to approximately 177 degrees Centigrade (350 degrees Fahrenheit). Either borosilicate or quartz glass probe lines may be used for stack temperatures up to approximately 480 degrees Centigrade (900 degrees Fahrenheit); quartz liners shall be used for temperatures between 480 and 900 degrees Centrigrade (900 and 1650 degrees Fahrenheit). Both types of glass liners may be used at higher temperatures than specified for short periods of time, subject to the approval of the commission. The softening temperature for borosilicate is 820 degrees Centrigrade (1508 degrees Fahrenheit) and for quartz it is 1500 degrees Centigrade (2732 degrees Fahrenheit).

(3) Pitot tube. Type S, as described in section 2.1 of method 2, or other device approved by the commission. The pitot tube shall be attached to the probe, as shown in figure 101, to allow constant monitoring of the stack gas velocity. The impact (high pressure) opening plane of the pitot tube shall be even with or above the nozzle entry plane (see method 2, figure 2-6b) during sampling. The type S pitot tube assembly shall have a known coefficient, determined as outlined in section 4 of method 2.

(4) Differential pressure gauge. Incline manometer or equivalent devices (2), as described in section 2.2 of method 2. One manometer shall be used for velocity head (Δp) readings, and the other, for orifice differential pressure readings.

(5) Filtering system.

(a) Impinger set. The primary portion of the filtering system shall contain 3 impingers connected in series with leak-free ground glass fittings or any similar leak-free noncontaminating fittings. The first and second impingers shall be of the Greenburg-Smith design and shall contain a known quantity of water (see paragraph (iv)(A)(3) of this method). The third impinger shall be of the Greenburg-Smith design, modified by replacing the tip with 1.3 cm (1/2 in) ID glass tube extending to about 1.3 cm (1/2 in) from the bottom of the flask and shall be empty. Modifications (e.g., using flexible connections between the impingers, or using materials other than glass) may be used, subject to the approval of the commission.

(b) Back-up filter. The secondary portion of the filtering system shall contain 1 dry filter following the impinger set (see figure 101). The filter media shall be of the type specified in paragraph (iii)(A)(1) of this method). Filter holder construction materials may be stainless steel (316), glass, teflon, or such other material approved by the commission. The holder design shall provide a positive seal against leakage from the outside or around the filter.

(6) Filter heating system. Auxiliary heating of the secondary filter media is optional. Most filters employed in this train do not require heating to prevent blinding (see paragraph (iii)(A)(1) of this method).

(7) Condenser. The stack gas moisture content shall be determined from the impinger set (see subparagraph (A)(5)(a) of this paragraph), including a tared silica gel, or equivalent desiccant, trap following the back-up filter media. The trap shall be of the Greenburg-Smith design and shall be modified by replacing the tip with a 1.3 cm (1/2 in) ID glass tube extending to about 1.3 cm (1/2 in) from the bottom of the flask. Alternatively, the trap may be constructed from noncontaminating materials and in a manner that allows weight gain to within 1 g, subject to the approval of the commission.

(8) Metering system. Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 3 degrees Centigrade (5.4 degrees Fahrenheit), dry gas meter capable of measuring volume to within 2%, and related equipment as shown in figure 101. Other metering systems capable of maintaining sampling rates within 10% of isokinetic and capable of determining sample volumes to within 2% may be used, subject to the approval of the commission. When the metering system is used in conjunction with a pitot tube, the system shall enable checks of isokinetic rates.

Sampling trains utilizing metering systems designed for higher flow rates than those described in APTD-0581 or APTD-0576 may be used if the specifications of this method are met.

(9) Barometer. Mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in. Hg). In many cases, the barometric reading may be obtained from a nearby national weather service station. When obtained from this source, the station value, which is the absolute barometric pressure, shall be requested and an adjustment for elevation differences between the weather station and sampling point shall be applied at a rate of minus 2.5 mm Hg (0.1 in. Hg) per 30 m (100 ft.) elevation increase or vice versa for elevation decrease.

(10) Gas density determination equipment. Temperature sensor and pressure gauge, as described in sections 2.3 and 2.4 of method 2, and gas analyzer, if necessary, as described in method 3. The temperature sensor shall, preferably, be permanently attached to the pitot tube or sampling probe in a fixed configuration such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal. Alternatively, the sensor may be attached just prior to use in the field. Note,

however, that if the temperature sensor is attached in the field, the sensor shall be placed in an interference-free arrangement with respect to the type S pitot tube openings (see method 2, figure 2-7). As a second alternative, if a difference of not more than 1% in the average velocity measurement is to be introduced, the temperature gauge need not be attached to the probe or pitot tube. This alternative is subject to the approval of the commission.

(11) Sample tubing. Flexible interconnecting tubing between the probe and the first impinger may be made of teflon, tygon, polypropylene, polyethylene, or any similar or equivalent material that is nonreactive with stack gas and allows quantitative removal of particulate from inside surfaces. Only distilled water shall be used as wash solvent in this section of the sampling train if the sample tubing selected is affected by acetone solvent.

(B) Sample recovery. The following items are needed:

(1) Probe-liner and probe-nozzle brushes. Nylon bristle brushes with stainless steel wire handles. The probe brush shall have extensions, at least as long as the probe, made of stainless steel, nylon, teflon, or similarly inert material. The brushes shall be properly sized and shaped to brush out the probe liner and nozzle.

(2) Wash bottles--2. Glass wash bottles are recommended; polyethylene wash bottles may be used at the option of the tester. It is recommended that acetone not be stored in polyethylene bottles for longer than a month.

(3) Glass sample storage containers. Chemically resistant, borosilicate glass bottles for acetone washes, 500 ml or 1000 ml. Screw cap liners shall either be rubber-backed teflon or shall be constructed so as to be leak-free and resistant to chemical attack. Narrow-mouth glass bottles have been found to be less prone to leakage. Alternatively, polyethylene bottles may be used.

(4) Filter containers. Glass, polyethylene, or aluminum tube containers, unless otherwise specified by the commission.

(5) Graduated cylinder and/or balance. To measure condensed water to within 1 ml or 1 g. Graduated cylinders shall have subdivisions of not more than 2 ml. Most laboratory balances are capable of weighing to the nearest 0.5 g or less. Any of these balances are suitable for use here and in subparagraph (C)(4) of this paragraph.

(6) Plastic storage containers. Airtight containers to store silica gel.

(7) Funnel and rubber policeman. To aid in the transfer of silica gel to container; not necessary if silica gel is weighed in the field.

(8) Funnel. Glass or polyethylene, to aid in sample recovery.

(C) Analysis. The following equipment is needed for analysis:

(1) Glass weighing dishes.

(2) Desiccator.

(3) Analytical balance. To measure to within 0.1 mg.

(4) Balance. To measure to within 0.5 mg.

(5) Beakers. 250 ml.

(6) Hygrometer. To measure the relative humidity of the laboratory environment.

(7) Temperature gauge. To measure the temperature of the laboratory environment.

(iii) Reagents.

(A) Sampling. The reagents used in sampling are as follows:

(1) Filter. Glass fiber filter, with or without organic binder, exhibiting not less than 99.95% efficiency (less than or equal to 0.05% penetration) on 0.3 micron dioctyl phthalate smoke particles. The filter efficiency test shall be conducted in accordance with ASTM standard method D2986-71. Test data from the supplier's quality control program are sufficient for this purpose. The filter shall exhibit a stable weight when prepared and analyzed according to the procedures of this method.

(2) Silica gel. Indicating type, 6 to 16 mesh. If previously used, dry at 175 degrees Centigrade (350 degrees Fahrenheit) for 2 hours. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used, subject to the approval of the commission.

(3) Water. Distilled water shall be used in the impingers. Run blanks prior to field use to eliminate a high blank on test samples.

(4) Crushed ice.

(5) Stopcock grease. Acetone-insoluble, heat-stable silicone grease. This is not necessary if screw-on connectors with teflon sleeves, or equivalent, are used. Alternatively, other types of stopcock grease may be used, subject to the approval of the commission.

(B) Sample recovery. Washing solvent. Either acetone or distilled water may be used for sample recovery. If acetone is used for washing solvent, then reagent grade, less than 0.001% residue, in glass bottles is required. Acetone from metal containers generally has a high residue blank and shall not be used.

Suppliers sometime transfer acetone to glass bottles from metal containers; thus, acetone blanks shall be run prior to field use and only acetone with low blank values (less than 0.001%) shall be used. In no case shall a blank value of more than 0.001% of the weight of acetone used be subtracted from the sample weight.

If distilled water is used for washing solvent, use distilled water with less than 0.001% residue. Run blanks prior to field use to eliminate a high blank on test samples. Only distilled water shall be used in sections of the sampling train, such as flexible tubing, that otherwise may be dissolved by acetone.

(C) Analysis. Two reagents are required for the analysis:

(1) Solvent. Same as subparagraph (B) of this paragraph for quantitative transfer.

(2) Desiccant. Anhydrous calcium sulfate, indicating type. Alternatively, other types of desiccants may be used, subject to the approval of the commission.

(iv) Procedure.

(A) Sampling. The complexity of this method is such that, in order to obtain reliable results, testers shall be trained and experienced with the test procedures.

(1) Pretest preparation. All the components shall be maintained and calibrated according to the applicable procedures described in APTD-0576, unless otherwise specified herein.

Weigh several 200 to 300 g portions of silica gel in airtight containers to the nearest 0.5 g. Record the total weight of the silica gel plus container on each container. As an alternative, the silica gel need not be preweighed, but may be weighed directly in its impinger or sampling holder just prior to train assembly.

Check filters visually against light for irregularities, flaws, pinhole leaks, or cracks. Label filters of the proper size on the back side using numbering machine ink. As an alternative, label the shipping containers (paragraph (ii)(B)(4) of this method) and keep the filters in these containers at all times, except during sampling and weighing.

Dry the filters in an oven at 105 degrees Centigrade (220 degrees Fahrenheit) for a minimum of 2 hours, cool for at least 1 hour in a desiccator containing anhydrous calcium sulfate, and weigh and record its weight to the nearest 0.1 mg. During the weighing, the filter shall not be exposed to the laboratory atmosphere for a period of more than 2 minutes and a relative humidity above 50%. Procedures, other than those specified, that account for relative humidity effects may be used, subject to the approval of the commission.

(2) Preliminary determinations. Select the sampling site and the minimum number of sampling points according to method 1 or as specified by the commission. Determine the stack pressure, temperature, and the range of velocity heads using method 2; it is recommended that a leak check of the pitot lines (see method 2, section 3.1) be performed. Determine the moisture content using approximation method 4, or its alternatives, for the purpose of making isokinetic sampling rate settings. Determine the stack gas dry molecular weight, as described in method 2, section 3.6; if integrated method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as, the particulate sample run.

Select a nozzle size based on the range of velocity heads so that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates. During the run, do not change the nozzle size. Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see section 2.2 of method 2).

Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, consider sampling from opposite sides of the stack to reduce the length of probes.

Select a total sampling time greater than or equal to the minimum total sampling time specified in the test procedures for the specific industry so that (1) the sampling time per point is not less than 5 minutes, unless approved by the commission (or some greater time interval as specified by the commission), and (2) the sample volume taken, corrected to standard conditions, exceeds the required minimum total gas sample volume. The latter is based on an approximate average sampling rate.

It is recommended that the number of minutes sampled at each point be an integer or an integer plus 1/2 minute to avoid timekeeping errors.

In some circumstances, such as in batch cycles, it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas sample volumes. In these cases, the commission's approval shall first be obtained.

(3) Preparation of collection train. During preparation and assembly of the sampling train, keep all openings where contamination can occur covered until just prior to assembly or until sampling is about to begin.

Place 100 ml of water in each of the first and second impingers, leave the third impinger empty, and transfer approximately 200 to 300 g of preweighed silica gel from its container to the fourth impinger. More silica gel may be used, but care should be taken to ensure that it is not entrained and carried out from the impinger during sampling. Place the container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

Using tweezers or clean disposable surgical gloves, place a labeled (identified) and weighed filter in the filter holder. Be sure that the filter is properly centered and the gasket properly placed so as to prevent the sample gas stream from circumventing the filter. Check the filter for tears after assembly is completed.

When glass liners are used, install the selected nozzle using a Viton A O-ring when stack temperatures are less than 260 degrees Centigrade (500 degrees Fahrenheit) and an asbestos string gasket when temperatures are higher. See APTD-0576 for details. Other connecting systems using either 316 stainless steel or teflon ferrules may be used. When metal liners are used, install the nozzle in the same manner as for glass liners or by a leak-free direct mechanical connection. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

Set up the train as in figure 101. If necessary, use a very light coat of silicone grease on all ground glass joints. Grease only the outer portion (see APTD-0576) to avoid the possibility of contamination by the silicone grease.

Place crushed ice around the impingers.

(4) Leak check procedures.

(a) Pretest leak check. A pretest leak check is strongly recommended, but not required, to prevent invalid sampling and wasted time. If the tester opts to conduct the pretest leak check, the following procedure shall be used:

Perform the leak check on the entire system, including the nozzle, by plugging the nozzle and pulling a 380 mmHg (15 in. Hg) vacuum. Alternatively, a lower vacuum may be used if it is not exceeded during the test. Leakage rates in excess of 4% of the average sampling rate or 0.00057 m^3/min (0.02 cfm), whichever is less, are unacceptable.

The following leak check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with the bypass valve fully open and the coarse adjust valve completely closed. Partially open the coarse adjust valve and slowly close the bypass valve until the desired vacuum is reached. Do not reverse the direction of the bypass valve; this will cause water to back up into the flexible sample tube from the impinger. If the desired vacuum is exceeded, either leak-check at this higher vacuum or end the leak check and start over.

When the leak check is completed, first slowly remove the plug from the inlet to the nozzle and immediately turn off the vacuum pump. This prevents the water in the first impinger from being forced backward into the sample tube and prevents silica gel from being entrained backward into the back-up filter.

(b) Leak checks during sample run. If, during the sampling run, a component (such as a filter assembly or impinger) change becomes necessary, a leak check shall be conducted immediately before the change is made. The leak check shall be done according to the procedure outlined in subparagraph (A)(4)(a) of this paragraph, except that it shall be done at a vacuum equal to or greater than the maximum value recorded up to that point in the test. If the leakage rate is found to be not more than 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate, whichever is less, the results are acceptable and no correction need be applied to the total volume of dry gas metered; if, however, a higher leakage rate is obtained, the tester shall either record the leakage rate and plan to correct the sample volume, as shown in paragraph (vi)(C) of this method, or shall void the sampling run.

Immeditely after component changes, leak checks are optional; if such leak checks are done, the procedure outlined in subparagraph (A)(4)(a) of this paragraph shall be used.

(c) Post-test leak check. A leak check is mandatory at the conclusion of each sampling run. The leak check shall be done in accordance with the procedures outlined in subparagraph (A)(4)(a) of this paragraph, except that it shall be conducted at a vacuum equal to or greater than the maximum value reached during the sampling run. If the leakage rate is found to be not more than 0.00057 m^3/min (0.02 crm) or 4% of the average sampling rate, whichever is less, the results are acceptable and no correction need be applied to the total volume of dry gas metered. If, however, a higher leakage rate is obtained, the tester shall either record the leakage rate and correct the sample volume, as shown in paragraph (vi)(C) of this method, or shall void the sampling run.

(5) Particulate train operation. During the sampling run, maintain an isokinetic sampling rate that is within 10% of true isokinetic, unless otherwise specified by the commission.

For each run, record the data required on a data sheet such as the one shown in figure 104. Be sure to record the initial dry-gas meter reading. Record the dry-gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made, before and after each leak check, and when sampling is halted. Take other readings required by figure 104 at least once at each sample point during each time increment, and take additional readings when significant changes (20% variation in velocity head readings) necessitate additional adjustments in flow rate. Level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

Clean the portholes prior to the test run to minimize the chance of sampling deposited material. To begin sampling, remove the nozzle cap and verify that the pitot tube and probe are properly positioned. Position the nozzle at the first traverse point with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs that aid in the rapid adjustment of the isokinetic sampling rate without excessive computations are available. These nomographs are designed for use when the type S pitot tube coefficient is 0.85 0.02 and the stack gas equivalent density (dry molecular weight) is equal to 29 4. APTD-0576 details the procedure for using the nomographs unless appropriate steps (see paragraph (vii)(D) of this method) are taken to compensate for the deviations.

When the stack is under significant negative pressure (height of impinger stem), take care to pull low flow when inserting the probe into the stack to prevent water from backing into the sample tubing and to avoid pulsation through the filter and possible loss of materials.

When the probe is in position, block off the openings around the probe and porthole to prevent unrepresentative dilution of the gas stream.

Traverse the stack cross section, as required by method 1 or as specified by the administrator, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the portholes; this minimizes the chance of extracting deposited material.

During the test run, add more ice and, if necessary, salt to maintain a temperature of less than 20 degrees Centigrade (68 degrees Fahrenheit) at the silica gel trap outlet. Also, periodically check the level and zero of the manometer.

If the pressure drop across the filter or impinger set becomes too high and makes isokinetic sampling difficult to maintain, the filter or impingers may be replaced in the midst of a sample run. Before a new filter assembly is installed, conduct a leak check (see subparagraph (A)(4)(b) of this paragraph). The total particulate weight shall include the summation of all filter and impinger assembly catches.

A single train shall be used for the entire sample run, except in cases where simultaneous sampling is required in 2 or more separate ducts, at 2 or more different locations within the same duct, or where equipment failure necessitates a change of trains. In all other situations, the use of 2 or more trains shall be subject to the approval of the commission.

Note that when 2 or more trains are used, separate analyses of the washings and impinger catches from each train shall be performed. Consult with the commission for details concerning the calculation of results when 2 or more trains are used.

At the end of the sample run, turn off the coarse adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final dry gas meter reading, and conduct a post-test leak check, as outlined in subparagraph (A)(4)(c) of this paragraph. Also, leak-check the pitot lines as described in method 2, section 3.1; the lines shall pass this leak check to validate the velocity head data.

(6) Calculation of percent isokinetic. Calculate percent isokinetic (see paragraph (vi) of this method) to determine whether the run was valid or whether another test run should be made. For the purposes of this calculation, the moisture content of stack gas may be calculated from a visual estimate of the condensate in the impingers. Do not remove the contents of the impingers (see subparagraph (C) of this paragraph). If there was difficulty in maintaining isokinetic rates due to source conditions, consult with the commisison for possible variance on the isokinetic rates.

(B) Sample recovery. Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool.

When the probe can be safely handled, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over it to prevent losing or gaining particulate matter. Do not cap off the probe tip tightly while the sampling train is cooling down as this creates a vacuum in the probe and draws water from the impingers into the sample tubing.

Before moving the sampling train to the cleanup site, make sure all condensed water in the probe and flexible sample lines drains into the first impinger. Disconnect the sample line from the probe and cap all openings to prevent contamination or accidental loss of sample. Remove all excess particulates from the exterior of the nozzle-probe assembly to prevent contamination during disassembly.

Transfer the nozzle-probe assembly and impinger set to the cleanup area. This area shall be clean and protected from the wind so that the chances of contaminating or losing the sample are minimized.

Save a portion of the solvent used for cleanup as a blank. Take 200 ml of this solvent directly from the wash bottle being used and place it in a glass sample container labeled "solvent blank."

Inspect the train prior to and during disassembly and note any abnormal conditions. Treat the samples as follows:

Container No. 1. Carefully remove the filter from the filter holder and place it in its identified container. Use a pair of tweezers or clean disposable surgical gloves, or both, to handle the filters. Carefully transfer to the container any particulate matter or filter fibers, or both, that adhere to the filter holder gasket by using a dry nylon bristle brush or sharp-edged blade, or both. Seal the container.

Container No. 2. Taking care to see that dust on the outside of the probe or other exterior surfaces does not get into the sample, the testor shall quantitatively recover particulate matter or any condensate from the probe nozzle, probe fittings, probe lines, sample tubing between the probe, and the first impinger, interconnecting tubing between the impingers, and the filter holder by washing these components with wash solvent and placing the wash in a glass container. Perform the washings as follows:

Carefully remove the probe nozzle and clean the inside surface by rinsing with solvent from a wash bottle and brushing with a nylon bristle brush. Brush until the solvent rinse shows no visible particles and then make a final rinse of the inside surface.

Brush and rinse the inside parts of the Swagelok fitting with solvent in a similar manner until no visible particles remain.

Rinse the probe liner with solvent by tilting and rotating the probe while squirting solvent into its upper end so that all inside surfaces are wetted. Let the solvent drain from the lower end into the sample container. A glass or polyethylene funnel may be used to aid in transferring liquid washes to the container. If the volume of rinses becomes too much for 1 container, another may be used and appropriately identified. Follow the solvent rinse with a probe brush. Hold the probe in an inclined position and squirt solvent into its upper end as the probe brush is being pushed with a twisting action through the probe; hold a sample container underneath the lower end of the probe and catch any solvent and particulate matter that is brushed from the probe. Run the brush through the probe 3 or more times until no visible particulate matter is carried out with the solvent or until none remains in the probe liner on visual inspection. With stainless steel or other metal probe liners, run the brush through, in the above prescribed manner, not less than 6 times, since metal probes have small crevices in which particulate matter can be entrapped. Rinse the brush with solvent and quantitatively collect these washings in the sample container. After the brushing, make a final rinse of the probe as described above.

Wash the interior surface of the sample tubing between the probe and first impinger by using the same procedures used to wash the probe liner.

It is recommended that 2 people be used to clean the probe and sample tubing to minimize sample losses. Between sampling runs, keep brushes clean and protected from contamination.

After ensuring that all joints have been wiped clean of any silicone grease, clean the inside of the filter holder by rubbing the surfaces with a nylon bristle brush and rinsing with solvent. Rinse each surface 3 times, or more if needed, to remove visible particulate. Make a final rinse of the brush and filter holder.

Remove the interconnecting tubing between the impingers and seal the impingers. Wash the tubing in the same manner as the filter holder. After all washings and particulate matter have been collected in the sampler container, tighten the lid on the sample container so that solvent will not leak out when it is shipped to the laboratory. Mark the height of the fluid level to determine whether or not leakage occurred during transport. Label the container to clearly identify its contents.

Container No. 3. Note the color of the indicating silica gel to determine if it has been completely spent and make a notation of its condition. Transfer the silica gel from the fourth impinger to its original container and seal. A funnel may make it easier to pour the silica gel without spilling it. A rubber policeman may be used as an aid in removing the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use any water or other liquids to transfer the silica gel. If a balance is available in the field, follow the procedure for container No. 3 in subparagraph (C) of this paragraph.

Impingers. To reduce the possibility of loss or contamination, the contents of the first 3 impingers shall not be removed while at the sampling site. They shall be removed only in the laboratory during analysis (see subparagraph (C) of this paragraph). Make sure all openings are sealed and that barrel and stem joints are secure. Mark the height of the fluid level to determine whether or not leakage occurred during transport. Label each impinger to clearly identify its contents.

Alternatively, the impinger assembly, including the interconnecting tubing, may remain connected if mounted in a self-contained unit or structure for transport to the laboratory for analysis. Seal the inlet and outlet of the assembly to prevent contamination. Inspect and secure all joints. Whenever possible, containers shall be shipped in a manner that keeps them upright at all times.

(C) Analysis. Record the data required on a sheet such as the one shown in figure 105.

Container No. 1. Transfer the filter and any loose particulate from the sample container to a tared-glass weighing dish. Dry the filter in an oven at 105 degrees Centigrade (220 degrees Fahrenheit) for a minimum of 2 hours, cool for at least 1 hour in a desiccator containing anhydrous calcium sulfate, and weigh and record its weight to the nearest 0.1 mg. During the weighing, the filter shall not be exposed to the laboratory atmosphere for a period of more than 2 minutes and a relative humidity above 50%. Procedures, other than those specified, that account for relative humidity effects may be used, subject to approval of the commission. The method used for the drying and weighing of filters shall be consistent before and after the test.

Container No. 2. Note the level of liquid in the container and confirm on the analysis sheet whether or not leakage occurred during transport. If a noticeable amount of leakage has occurred, void the sample. Measure the liquid in the container either volumetrically to ±1 ml or gravimetrically to ±1.0 g. Transfer the contents in whole or in portions to a tared beaker and evaporate to dryness either at ambient temperature and pressure for acetone or at 95 degrees Centigrade (203 degrees Fahrenheit) in an oven for distilled water. Then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) in an oven for 2 to 3 hours. Desiccate 24 hours and weigh the sample to a constant weight. Report the results to the nearest 0.1 mg.

Container No. 3. Weigh the spent silica gel, or silica gel plus impinger, to the nearest 0.5 g using a balance. This step may be conducted in the field.

Impingers. Note the level of liquid in each impinger and confirm on the analysis sheet whether or not leakage occurred during transport. If a noticeable amount of leakage has occurred, void the sample. Impingers may be analyzed separately or combined. Measure the liquid in each impinger either volumetrically to ±1 ml or gravimetrically to ±1.0 g. It is recommended that the gravimetric method be used to reduce the number of times the contents are transferred before drying. Transfer the liquid impinger contents to a tared 250 ml beaker and quantitatively transfer any particualte remaining in the barrel or stem of the impinger using wash solvent and a rubber policeman if necessary. Rinse all internal parts of the impinger until no particulate remains on visual inspection. Evaporate the sample to dryness in an oven at 95 degrees Centigrade (203 degrees Fahrenheit) and then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) for 2 to 3 hours. Desiccate the sample for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

"Solvent blank" container. Measure solvent in this container either volumetrically or gravimetrically. Transfer the contents to a tared 250 ml beaker and evaporate to dryness either at ambient temperature and pressure for acetone or at 95 degrees Centigrade (203 degrees Fahrenheit) in an oven for distilled water. Then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) in an oven for 2 to 3 hours. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

(v) Calibration. Maintain a laboratory log of all calibrations.

(A) Probe nozzle. Probe nozzles shall be calibrated before their initial use in the field. Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in.). Make 3 separate measurements using different diameters each time and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in.). When nozzles become nicked, dented, or corroded, they shall be reshaped, sharpened, and recalibrated before use. Each nozzle shall be permanently and uniquely identified.

(B) Pitot tube. The type S pitot tube assembly shall be calibrated according to the procedures outlined in section 4 of method 2.

(C) Metering system. Before its initial use in the field, the metering system shall be calibrated according to the procedure outlined in APTD-0576. Instead of physically adjusting the dry-gas meter dial readings to correspond to the wet-test meter readings, calibration factors may be used to mathematically correct the gas meter dial readings to the proper values. Before calibrating the metering system, it is suggested that a leak check be conducted. For metering systems having diaphram or rotary pumps, the normal leak check procedure will not detect leakages within the pump. For these cases, the following leak check procedure is suggested:

Make a 10-minute calibration run at 0.00057 m^3/min (0.02 cfm); at the end of the run, take the difference of the measured wet-test meter and dry-gas meter volumes; divide the difference by 10 to get the leak rate. The leak rate shall not exceed 0.00057 m^3/min (0.02 cfm).

After each field use, the calibration of the metering system shall be checked by performing 3 calibration runs at a single, intermediate orifice setting, based on the previous field test, with the vacuum set at the maximum value reached during the test series. To adjust the vacuum, insert a valve between the wet-test meter and the inlet of the metering system. Calculate the average value of the calibration factor. If the calibration has changed by more than 5%, recalibrate the meter over the full range of orifice settings, as outlined in APTD-0576.

Alternatively, a spirometer may be substituted for a wet-test meter in the above mentioned calibration procedures.

Alternative procedures, such as using the orifice meter coefficients, may be used, subject to the approval of the commission. If the dry-gas meter coefficient values obtained before and after a test series differ by more than 5%, the test series shall be performed using whichever meter coefficient value (before or after) gives the lower value of total sample volume.

(D) Temperature gauges. Use the procedure in section 4.3 of method 2 to calibrate instack temperature gauges. Dial thermometers, such as those used for the dry-gas meter and condenser outlet, shall be calibrated against mercury-in-glass thermometers.

(E) Leak check of metering system shown in figure 101. That portion of the sampling train from the pump to the orifice meter shall be leak-checked prior to initial use and after each shipment. Leakage after the pump will result in less volume being recorded than is actually sampled. The following procedure is suggested (see figure 107): Close the main valve on the meter box. Insert a 1-hole rubber stopper with rubber tubing attached into the orifice exhaust pipe. Disconnect and vent the low side of the orifice manometer. Close off the low side orifice tap. Pressurize the system to 13 to 18 cm (5 to 7 in.) water column by blowing into the rubber tubing. Pinch off the tubing and observe the manometer for 1 minute. A loss of pressure on the manometer indicates a leak in the meter box; leaks, if present, shall be corrected.

(F) Barometer. Calibrate against a mercury barometer.

(vi) Calculations.

When carrying out calculations, retain at least 1 extra decimal figure beyond that of the acquired data. Round off figures after the final calculation. Other forms of the equations may be used if they give equivalent results.

(A) Nomenclature.

An = Cross-sectional area of nozzle, m^2 (ft^2).

A = Cross-sectional area of stack or flue at the point of sampling, ft^2.

Bws = Water vapor in the gas stream, proportion by volume, expressed as a fraction.

Bwi = Percent water vapor in gas entering source particulate control device determined by method 4.

Bwo = Percent water vapor in gas exiting source particulate control device.

Ca = Wash blank residue concentration, mg/g.

Cs = Concentration of particulate matter in stack gas, pounds per 1000 pounds of actual stack gas.

Csd = Concentration of particulate matter in stack gas, moisture excluded, pounds per 1000 pounds of dry stack gas.
Cs5o = Concentration of particulate matter corrected to 50% excess air, pounds per 1000 pounds of stack gas.
Cs5od = Concentration of particulate matter corrected to 50% excess air, excluding any water addition from a collector, pounds per 1000 of stack gas.
E = Mass emission rate of particulate, lb/hr.
F5o = Concentration conversion factor to 50% excess air with no moisture alterations in exhaust.
F5od = Concentration conversion factor to 50% excess air, excluding any moisture added to exhaust gas by pollution collection system.
Fd = Concentration conversion factor to dry basis, excluding any water in the stack gas.
I = Percent of isokinetic sampling.
La = Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate, whichever is less.
Li = Individual leakage rate observed during the leak check conducted prior to the "ith" component change (i   1, 2, 3 . . . . n), m^3/min (cfm).
Lp = Leakage rate observed during the post-test leak check, m^3/min (cfm).
Md = Molecular weight of dry stack gas, g/g mole (lb/lb-mole), calculated by method 3, equation 3-2, using data from integrated method 3.
mn = Total amount of particulate matter collected, mg.
Mw = Molecular weight of water, 18.0 g/g-mole (18.0 lb/lb-mole).
ma = Mass of residue of solvent after evaporation, mg.
mg = Total weight of gas samples through nozzle, lb.
Pbar = Barometric pressure at the sampling site, mm Hg (in. Hg).
Ps = Absolute stack gas pressure.
Pstd = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).
R = Ideal gas constant, 0.06236 mm Hg-m^3/^{o}K-g-mole (21.85 in. Hg-ft^3/^{o}R-lb-mole).
Tm = Absolute average dry-gas meter temperature (see figure 5-2), ^{o}K (^{o}R).
Ts = Absolute average stack gas temperature (see figure 5-2), ^{o}K (^{o}R).
Tstd = Standard absolute temperature, 294.1^{o}K (530^{o}R).
Va = Volume of solvent blank, ml.
Vaw = Volume of solvent used in wash, ml.
Vlc = Total volume of liquid collected in impingers and silica gel (see figure 105), ml.
Vm = Volume of gas sample as measured by the dry-gas meter, dcm (dcf).
Vm(std) = Volume of gas sample measured by the dry-gas meter, corrected to standard conditions, dscm (dscf).
Vw(std) = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf).
Vs = Stack gas velocity, calculated by method 2, equation 2-9, using data obtained from method 5, m/sec (ft/sec).
Wa = Weight of residue in solvent wash, mg.
Y = Dry-gas meter calibration factor.
ΔH = Average pressure differential across the orifice meter (see figure 104), mm H_2O (in H_2O).

$\%O_2$ = Percent oxygen in stack gas by volume (dry basis).
$\%N_2$ = Percent nitrogen in stack gas by volume (dry basis).
pa = Density of solvent, mg/ml.
ps(std) = Density of all sampled gas at standard conditions, lb/ft^3.
pw = Density of water, 0.9982 g/ml (0.002201 lb/ml).
Θ = Total sample time, min.
Θ_1 = Sample time, interval, from the beginning of a run until the first component change, min.
Θ_i = Sampling time interval, between 2 successive component changes, beginning with the interval between the first and second changes, min.
Θp = Sampling time interval, from the final (n^{th}) component change until the end of the sampling run, min.
13.6 = Specific gravity of mercury.
60 = Sec/min.
100 = Conversion to percent.
386.9 = Cubic feet per lb-mole of ideal gas at standard conditions.
453.9 = Conversion of pounds to grams.
3600. = Conversion of hours to sec.
1000 = Conversion of 1000 lb units to lb units.

(B) Average the dry-gas meter temperature and average the orifice pressure drop. See data sheet (figure 104).

(C) Dry gas volume. Correct the sample volume measured by the dry-gas meter to standard conditions (21.1 degrees Centigrade, 760 mm Hg or 70 degrees Fahrenheit, 29.92 in. Hg) by using equation 5-1.

$$Vm(std) = \frac{Vm\ Y\ Tstd\ (Pbar\ \&\ \Delta H/13.6)}{Tm\ Pstd}$$

$$= K1\ Vm\ Y\ \frac{Pbar\ \&\ (\Delta H/13.6)}{Tm} \qquad \text{equation 5-1}$$

where:
K1 = 0.3869 °K/mm Hg for metric units.
= 17.71 °R/in. Hg for English units.

Equation 5-1 may be used as written. However, if the leakage rate observed during any of the mandatory leak checks (i.e., the post-test leak check or leak checks conducted prior to component changes) exceeds La, equation 5-1 shall be modified as follows:

(1) Case I. No component changes made during sampling run. In this case, replace Vm in equation 5-1 with the expression:

$$Vm - (Lp - La)\Theta$$

(2) Case II. One or more component changes made during the sampling run. In this case, replace Vm in equation 5-1 by the expression:

$$Vm - (L_1 - La)\ \Theta_1 - \sum_{i=2}^{n} (L_i - L_a)\ \Theta_i - (L_p - L_a)\ \Theta_p$$

and substitute only for those leakage rates (L_i or L_p) that exceed L_a.

(D) Volume of water vapor.

$$Vw(std) = Vlc\ (pw/Mw)(RTstd/Pstd) = K_2\ V_{1c} \qquad \text{equation 5-2}$$

where:
K_2 = 0.001338 m^3/ml for metric units.
= 0.04733 ft^3/ml for English units.

(E) Moisture content.

$$Bws = Vw(std)/(Vm(std) + Vw(std)) \qquad \text{equation 5-3}$$

In saturated or water droplet--laden gas streams, 2 calculations of the moisture content of the stack gas shall be made: 1 from the impinger analysis (equation 5-3), and a second from the assumption of saturated conditions. The lower of the 2 values of Bws shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in the note of section 1.2 of method 4. For the purpose of this method, the average stack gas temperature from figure 104 may be used to make this determination, if the accuracy of the instack temperature sensor is ±1 degree Centigrade (2 degrees Fahrenheit).

(F) Solvent blank concentration.

$$Ca = ma/(Va\ pa) \qquad \text{equation 5-4}$$

(G) Solvent wash blank.

$$Wa = Ca\ Vaw\ pa \qquad \text{equation 5-5}$$

(H) Total particulate weight. Determine the total particulate catch from the sum of the weights obtained from container Nos. 1 and 2 and impingers 1, 2, and 3 less the wash solvent and impinger water blanks (see figure 105).

Refer to paragraph (iv)(A)(5) of this method to assist in the calculation of results involving 2 or more sampling trains.

(I) Sampled gas density. Determine the density of the gas sampled from the stack, at standard conditions (lb/ft^3).

$$ps(std) = (Md\ (1-Bws) + Mw\ Bws)/386.9 \qquad \text{equation 5-6}$$

(J) Total weight of gas sampled (lbs).

$$mg = (Vm(std) + Vw(std))\ ps(std) \qquad \text{equation 5-7}$$

(K) Particulate concentration (lbs/1000 lbs).

$$Cs = mn/(453.6\ mg) \qquad \text{equation 5-8}$$

(L) Excess air and moisture correction factors.

(1) Correction factor to 50% excess air for those sources with or without any particulate collector where no increase in moisture content of the exhaust gas occurs after the process and before the point of sampling.

$$F50 = \frac{Md + 18\ Bwo/(100-Bwo)}{0.1826\ \%N2 - 2.0592\ \%O2 + Md + 18\ Bwi/(100-Bwi)} \qquad \text{equation 5-9}$$

(2) Correction factor to 50% excess air for those sources with a wet collection device (scrubber) that increases the moisture content of the exhaust gas after the process and before the point of sampling.

$$F50D = \frac{Md + 18\ Bwo/(100-Bwo)}{0.1826\ \%N2 - 2.0592\ \%O2 + Md + 18\ Bwi/(100-Bwi)} \qquad \text{equation 5-10}$$

(3) Correction factor to convert the actual concentration, Cs, to dry conditions.

$$F = \frac{Md + 18\ Bwo/(100-Bwo)}{Md}$$

(M) Converted particulate concentrations, where applicable under the commission's rules or permit.

$$Cs50 = Cs\ F50 \qquad \text{equation 5-12}$$

$$Cs50D = Cs\ F50D \qquad \text{equation 5-13}$$

$$CsD = Cs\ FD \qquad \text{equation 5-14}$$

(N) Mass emission rate (lb/hr.).

$$E = \frac{3600\ A\ Vs\ Cs\ Ps\ Tstd\ ps(std)}{1000\ Ts\ Pstd}$$

$$= K3\ A\ Vs\ Cs\ Ps\ ps(std)/Ts$$

where:

K = 63.77 for English units.

(O) Isokinetic variation.
(1) Calculation from raw data.

$$I = \frac{100\ Ts\ (K4\ Vlc = (Vm/Tm)(Pbar + \Delta H/13.6))}{60\ \theta\ Vs\ Ps\ An} \qquad \text{equation 5-16}$$

where:
K4 = 0.003458 mm Hg - m^3ml - °K for metric units.
= 0.002672 in. Hg - ft^3/ml - °R for English units.
(2) Calculation from intermediate values.

$$I = \frac{Ts\ Vm(std)\ Pstd\ 100}{Tstd\ Vs\ \theta\ An\ Ps\ 60(1 - Bws)} \qquad \text{equation 5-17}$$

T V

$$= K5 \frac{Ts\ Vm(std)}{Ps\ Vs\ An\ \theta\ (1 - Bws)}$$

where:
K5 = 4.307 for metric units.
= 0.09409 for English units.

(P) Acceptable results. If 90% ≤ I ≤ 110%, the results are acceptable. If the results are low in comparison to the standard and I is beyond the acceptable range, or if I is less than 90%, the commission may opt to accept the results. Otherwise, reject the results and repeat the test.

(vii) Bibliography.

(A) Federal Register, Volume 42, No. 160, Part 60, Chapter 1, Title 40, Appendix A, Method 5, August 18, 1977.

(B) Martin, Robert M. Construction Details of Isokinetic Source Sampling Equipment. Environmental Protection Agency. Research Triangle Park, N.C. APTD-0581. April, 1971.

(C) Rom, Jerome J. Maintenance, Calibration, and Operation of Isokinetic Source Sampling Equipment. Environmental Protection Agency. Research Triangle Park, N.C. APTD-0576. March, 1972.

(D) Shigehara, R. T. "Adjustment in the EPA Nomograph for Different Pitot Tube Coefficients and Dry Molecular Weights." Stack Sampling News 2:4 - 11. October, 1974.

(E) Guidelines for Source Testing of Particulate. Michigan Department of Natural Resources, Air Quality Division. June 1, 1977.

(b) Method 5B - Instack filtration method. Method 5B reads as follows:

(i) Principle and applicability.

(A) Principle. Particulate matter is withdrawn isokinetically from the source and collected on solid filtering media maintained at stack temperature. The particulate matter mass is determined gravimetrically after removal of uncombined water.

(B) Applicability. This method is applicable for the determination of particulate emissions from stationary sources as specifically provided for in the commission's rules, a permit to install, or a permit to operate.

(ii) Apparatus.

(A) Sampling train. A schematic of the sampling train used in this method is shown in figure 102. Construction details for many, but not all, of the train components are given in APTD-0581 (paragraph (vii)(B) of this method). For changes from the APTD-0581 document and for allowable modifications to figure 102, consult with the commission.

The operating and maintenance procedures for many, but not all, of the sampling train are described in APTD-0576 (paragraph (vii)(C) of this method). Since correct usage is important in obtaining valid results, all users shall read APTD-0576 and adopt the applicable operating and maintenance procedures outlined in it, unless otherwise specified herein. The sampling train consists of the following components:

(1) Probe nozzle. Stainless steel (316) or glass with sharp, tapered leading edge. The angle of taper shall be less than 30 degrees and the taper shall be on the outside to preserve a constant internal diameter. The probe nozzle shall be of the button-hook design, unless otherwise specified by the commission. If made of stainless steel, the nozzle shall be constructed from seamless tubing. Other materials of construction may be used, subject to the approval of the commission.

A range of nozzle sizes suitable for isokinetic sampling shall be available, e.g., 0.32 to 1.27 cm. (1/8 to 1/2 in. - or larger if higher volume sampling trains are used - inside diameter (ID) nozzles in increments of 0.16 cm. (1/16 in). Each nozzle shall be calibrated according to the procedures outlined in paragraph (v) of this method.

(2) Probe liner. Interior surface may be constructed of stainless steel (no specific grade), glass, teflon, or such other material that maintains proper flow at the stack conditions experienced.

(3) Pitot tube. Type S, as described in section 2.1 of method 2, or other device approved by the commission. The pitot tube shall be attached to the probe, as shown in figure 102, to allow constant monitoring of the stack gas velocity. The impact (high pressure) opening plane of the pitot tube shall be even with or above the nozzle entry plane (see method 2, figure 2-6b) during sampling. The type S pitot tube assembly shall have a known coefficient, determined as outlined in section 4 of method 2.

(4) Differential pressure gauge. Incline manometer or equivalent devices (2) as described in section 2.2 of method 2. One manometer shall be used for velocity head (Δp) readings and the other shall be used for orifice differential pressure readings.

(5) Filter holders. Two separate filter holders in series or 1 filter holder with separate filter supports and seals for 2 filters. One filter holder with 2 filters held in contact with each other is not acceptable. Materials of construction may be stainless steel (316), glass, teflon, or such other material approved by the commission.

(6) Filter heating system. No auxiliary heating of the filter media is acceptable. For saturated stack gases, the operator may opt to use filters that do not blind when wet and that do not require heating (see paragraph (iii)(A)(1) of this method).

(7) Condenser. The following system shall be used to determine the stack gas moisture content: Three impingers connected in series with leak-free ground glass fittings or any similar leak-free noncontaminating fittings. All impingers shall be of the Greenburg-Smith design and shall be modified by replacing the tip with a 1.3 cm (1/2 in.) ID glass tube extending to about 1.3 cm (1/2 in.) from the bottom of the flask. Modifications, such as using flexible connections between the impingers or using materials other than glass, are permitted, subject to the approval of the commission. The first impinger shall contain a known quantity of water (paragraph (iv)(A)(3) of this method); the second shall be empty; and the third shall contain a known weight of silica gel or equivalent desiccant.

Alternatively, any system that cools the sample gas stream and allows measurement of the water condensed and moisture leaving the condenser, each to within 1 ml or 1 g, may be used, subject to the approval of the commission. In any case, the means for measuring the moisture leaving the condenser shall be by passing the sample gas stream through a tared silica gel, or equivalent desiccant, trap with exit gases kept below 20 degrees Centigrade (68 degrees Fahrenheit) and determining the weight gain.

If a determination of the particulate matter collected in the impingers is required by the commission's rules, a permit to install, or a permit to operate, the impinger system described above shall be used without modification. Contact the commission as to the sample recovery and analysis of the impinger contents.

(8) Metering system. Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 3 degrees Centigrade (5.4 degrees Fahrenheit), dry-gas meter capable of measuring volume to within 2%, and related equipment as shown in figure 102. Other metering systems capable of maintaining sampling rates within 10% of isokinetic and capable of determining sample volumes to within 2% may be used, subject to the approval of the commission. When the metering system is used in conjunction with a pitot tube, the system shall enable checks of isokinetic rates.

Sampling trains utilizing metering systems designed for higher flow rates than those described in APTD-0581 or APTD-0576 may be used if the specifications of this method are met.

(9) Barometer. Mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in. Hg). In many cases, the barometric reading may be obtained from a nearby national weather service station. In this case, the station value, which is the absolute barometric pressure, shall be requested and an adjustment for elevation differences between the weather station and sampling point shall be applied at a rate of minus 2.5 mm Hg (0.1 in. Hg) per 30 M (100 ft.) elevation increase or vice versa for elevation decrease.

(10) Gas density determination equipment. Temperature sensor and pressure gauge, as described in sections 2.3 and 2.4 of method 2, and gas analyzer, if necessary, as described in method 3. The temperature sensor shall, preferably, be permanently attached to the pitot tube or sampling probe in a fixed configuration such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal. Alternatively, the sensor may be attached just prior to use in the field. Note, however, that if the temperature sensor is attached in the field, the sensor shall be placed in an interference-free arrangement with respect to the type S pitot tube openings (see method 2, figure 2-7). As a second alternative, if a difference of not more than 1% in the average velocity measurement is to be introduced, the temperature gauge need not be attached to the probe or pitot tube. This alternative is subject to the approval of the commission.

(B) Sample recovery. The following items are needed:

(1) Probe-liner and probe-nozzle brushes. Nylon bristle brushes with stainless steel wire handles. The probe brush shall have extensions, at least as long as the probe, made of stainless steel, nylon, teflon, or similarly inert material. The brushes shall be properly sized and shaped to brush out the probe liner and nozzle.

(2) Wash bottles--2. Glass wash bottles are recommended; polyethylene wash bottles may be used at the option of the tester. It is recommended that acetone not be stored in polyethylene bottles for longer than a month.

(3) Glass sample storage containers. Chemically resistant, borosilicate glass bottles for acetone washes, 500 ml or 1000 ml. Screw cap liners

shall either be rubber-backed teflon or shall be constructed so as to be leak-free and resistant to chemical attack by acetone. Narrow-mouth glass bottles have been found to be less prone to leakage. Alternatively, polyethylene bottles may be used.

(4) Filter containers. Glass, polyethylene, or aluminum tube containers, unless otherwise specified by the commission.

(5) Graduated cylinder and/or balance. To measure condensed water to within 1 ml or 1 g. Graduated cylinders shall have subdivisions of not more than 2 ml. Most laboratory balances are capable of weighing to the nearest 0.5 g or less. Any of these balances are suitable for use here and in subparagraph (C)(4) of this paragraph.

(6) Plastic storage containers. Airtight containers to store silica gel.

(7) Funnel and rubber policeman. To aid in the transfer of silica gel to container; not necessary if silica gel is weighed in the field.

(8) Funnel. Glass or polyethlene, to aid in sample recovery.

(C) Analysis. The following equipment is needed for analysis:

(1) Glass weighing dishes.

(2) Desiccator.

(3) Analytical balance. To measure to within 0.1 mg.

(4) Balance. To measure to within 0.5 mg.

(5) Beakers. 250 ml.

(6) Hygrometer. To measure the relative humidity of the laboratory environment.

(7) Temperature gauge. To measure the temperature of the laboratory environment.

(iii) Reagents.

(A) Sampling. The reagents used in sampling are as follows:

(1) Filters. Two instack filters may be any combination of alundum ceramic thimble filters, type RA-98, or glass fiber filters, type A without organic binder. The size of such filters shall allow proper sampling rates to maintain isokinetics using the nozzle sizes specified in paragraph (ii)(A)(1) of this method.

Alternatively, other types of filters may be used, subject to the approval of the commission.

(2) Silica gel. Indicating type, 6 to 16 mesh. If previously used, dry at 175 degrees Centigrade (350 degrees Fahrenheit) for 2 hours. New silica gel may be used as received. Alternatively, other types of desiccants that are equivalent or better may be used, subject to the approval of the commission.

(3) Water. When analysis of the material caught in the impingers is required, distilled water shall be used. Run blanks prior to field use to eliminate a high blank of test samples.

(4) Crushed ice.

(5) Stopcock grease. Acetone-insoluble, heat-stable silicone grease. This is not necessary if screw-on connectors with teflon sleeves, or equivalent, are used. Alternatively, other types of stopcock grease may be used, subject to the approval of the commission.

(B) Sample recovery. Washing solvent. Either acetone or distilled water may be used for sample recovery. If acetone is used for washing solvent, then reagent grade, less than 0.001% residue, in glass bottles is required. Acetone from metal containers generally has a high residue blank and shall not be used. Suppliers sometimes transfer acetone to glass bottles from metal containers; thus, acetone blanks shall be run prior to field use and only acetone with low blank values (less than 0.001%) shall be used. In no case shall a blank value of more than 0.001% of the weight of acetone used be subtracted from the sample weight.

If distilled water is used for washing solvent, use distilled water with less than 0.001% residue. Run blanks prior to field use to eliminate a high blank on test samples.

(C) Analysis. Two reagents are required for the analysis:

(1) Solvent. Same as subparagraph (B) of this paragraph for quantitative transfer.

(2) Desiccant. Anhydrous calcium sulfate, indicating type. Alternatively, other types of desiccants may be used, subject to the approval of the commission.

(iv) Procedure.

(A) Sampling. The complexity of this method is such that, in order to obtain reliable results, testers shall be trained and experienced with the test procedures.

(1) Pretest preparation. All the components shall be maintained and calibrated according to the applicable procedures described in APTD-0576, unless otherwise specified herein.

Weigh several 200 to 300 g portions of silica gel in airtight containers to the nearest 0.5 g. Record the total weight of the silica gel plus container on each container. As an alternative, the silica gel need not be preweighed, but may be weighed directly in its impinger or sampling holder just prior to train assembly.

Check filters visually against light for irregularities, flaws, pinhole leaks, or cracks. Label filters of the proper size on the back side using numbering machine ink. As an alternative, label the shipping containers (paragraph (ii)(B)(4) of this method) and keep the filters in these containers at all times, except during sampling and weighing.

Dry the filters in an oven at 105 degrees Centigrade (220 degrees Fahrenheit) for a minimum of 2 hours, cool for at least 1 hour in a desiccator containing anhydrous calcium sulfate, and individually weigh and record their weights to the nearest 0.1 mg. During the weighing the filters shall not be exposed to the laboratory atmosphere for a period of more than 2 minutes and a relative humidity above 50%. Procedures, other than those specified, that account for relative humidity effects may be used, subject to the approval of the commission.

(2) Preliminary determinations. Select the sampling site and the minimum number of sampling points according to method 1 or as specified by the commission. Determine the stack pressure, temperature, and the range of velocity heads using method 2; it is recommended that a leak check of the pitot lines (see method 2, section 3.1) be performed. Determine the moisture content using approximation method 4, or its alternatives, for the purpose of making isokinetic sampling rate settings. Determine the stack gas dry molecular weight, as described in method 2, section 3.6; if integrated method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as, the particulate sample run.

Select a nozzle size based on the range of velocity heads so that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates. During the run, do not change the nozzle size. Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see section 2.2 of method 2).

Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, consider sampling from opposite sides of the stack to reduce the length of probes.

Select a total sampling time greater than or equal to the minimum total sampling time specified in the commission's rules so that (1) the sampling time per point is not less than 5 minutes, unless approved by the commission (or some greater time interval as specified by the commission), and (2) the sample volume taken, corrected to standard conditions, exceeds the required minimum total gas sample volume. The latter is based on an approximate average sampling rate.

It is recommended that the number of minutes sampled at each point be an integer or an integer plus 1/2 minute to avoid timekeeping errors.

In some circumstances, such as in batch cycles, it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas sample volumes. In these cases, the commission's approval shall first be obtained.

(3) Preparation of collection train. During preparation and assembly of the sampling train, keep all openings where contamination can occur covered until just prior to assembly or until sampling is about to begin.

Place 100 ml of water in the first impinger, leave the second impinger empty, and transfer approximately 200 to 300 g of preweighed silica gel from its container to the third impinger. More silica gel may be used, but care should be taken to ensure that it is not entrained and carried out from the impinger during sampling. Place the container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

Using tweezers or clean disposable surgical gloves, place a labeled (identified) and weighed filter in each filter holder. Be sure that the filter is properly centered and the gasket properly placed so as to prevent the sample gas stream from circumventing the filter.

Install the selected nozzle using a Viton A O-ring when stack temperatures are less than 260 degrees Centigrade (500 degrees Fahrenheit) and an asbestos string gasket when temperatures are higher. See APTD-0576 for details. Other connecting systems using either 310 stainless steel or teflon ferrules may be used to form a leak-free direct mechanical connection. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

Set up the train as in figure 102. If necessary, use a very light coat of silicone grease on all ground glass joints. Grease only the outer portion (see APTD-0576) to avoid the possibility of contamination by the silicone grease.

Place crushed ice around the impingers.

(4) Leak check procedures.

(a) Pretest leak check. A pretest leak check is strongly recommended, but not required, to prevent invalid sampling and wasted time. If the tester opts to conduct the pretest leak check, the following procedure shall be used:

Perform the leak check on the entire system, including filter housings and nozzle, by plugging the nozzle and pulling a 380 mmHg (15 in. Hg) vacuum.

Alternatively, a lower vacuum may be used if it is not exceeded during the test. Leakage rates in excess of 4% of the average sampling rate or 0.00057 m^3/min (0.02 cfm), whichever is less, are unacceptable.

The following leak check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with the bypass valve fully open and the coarse adjust valve completely closed. Partially open the coarse adjust valve and slowly close the bypass valve until the desired vacuum is reached. Do not reverse the direction of the bypass valve; this will cause water to back up into the flexible sample tube and the probe. If the desired vacuum is exceeded, either leak-check at this higher vacuum or end the leak check and start over.

When the leak check is completed, first slowly remove the plug from the inlet to the nozzle and immediately turn off the vacuum pump. This prevents the water in the first impinger from being forced backward into the sample tube and prevents silica gel from being entrained backward into the second impinger.

(b) Leak checks during sample run. If, during the sampling run, a component (such as a filter assembly or impinger) change becomes necessary, a leak check shall be conducted immediately before the change is made. The leak check shall be done according to the procedure outlined in subparagraph (A)(4)(a) of this paragraph, except that it shall be done at a vacuum equal to or greater than the maximum value recorded up to that point in the test. If the leakage rate is found to be not more than 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate, whichever is less, the results are acceptable and no correction need be applied to the total volume of dry gas metered; if, however, a higher leakage rate is obtained, the tester shall either record the leakage rate and plan to correct the sample volume, as shown in paragraph (vi)(C) of this method, or shall void the sampling run.

Immediately after component changes, leak checks are optional; if such leak checks are done, the procedure outlined in subparagraph (A)(4)(a) of this paragraph shall be used.

(c) Post-test leak check. A leak check is mandatory at the conclusion of each sampling run. The leak check shall be done in accordance with the procedures outlined in subparagraph (A)(4)(a) of this paragraph, except that it shall be conducted at a vacuum equal to or greater than the maximum value reached during the sampling run. If the leakage rate is found to be not more than 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate, whichever is less, the results are acceptable and no correction need be applied to the total volume of dry gas metered. If, however, a higher leakage rate is obtained, the tester shall either record the leakage rate and correct the sample volume, as shown in paragraph (vi)(C) of this method, or shall void the sampling run.

(5) Particulate train operation. During the sampling run, maintain an isokinetic sampling rate that is within 10% of true isokinetic, unless otherwise specified by the commission.

For each run, record the data required on a data sheet such as the one shown in figure 104. Be sure to record the initial dry-gas meter reading. Record the dry-gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made, before and after each leak check, and when sampling is halted. Take other readings required by figure 104 at least once at each sample point during each time increment, and take additional readings when significant changes (20% variation in velocity head readings) necessitate additional adjustments in flow rate. Level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

Clean the portholes prior to the test run to minimize the chance of sampling deposited material. To begin sampling, remove the nozzle cap and verify that the pitot tube and probe are properly positioned. Position the nozzle at the first traverse point with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs that aid in the rapid adjustment of the isokinetic sampling rate without excessive computations are available. These nomographs are designed for use when the type S pitot tube coefficient is 0.85±0.02 and the stack gas equivalent density (dry molecular weight) is equal to 29±4. APTD-0576 details the procedure for using the nomographs. If C_p and M_d are outside the above stated ranges, do not use the nomographs unless appropriate steps (paragraph (vii)(D) of this method) are taken to compensate for the deviations.

When the stack is under significant negative pressure (height of impinger stem), take care to pull low flow when inserting the probe into the stack to prevent water from backing into the sample tubing and to avoid pulsation through the filter and possible loss of materials.

When the probe is in position, block off the openings around the probe and porthole to prevent unrepresentative dilution of the gas stream.

Traverse the stack cross section, as required by method 1 or as specified by the commission, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the portholes; this minimizes the chance of extracting deposited material.

During the test run, add more ice and, if necessary, salt to maintain a temperature of less than 20 degrees Centigrade (68 degrees Fahrenheit) at the condenser/silica gel outlet. Also, periodically check the level and zero of the manometer.

If the pressure drop across the filter becomes too high and makes isokinetic sampling difficult to maintain, the filter may be replaced in the midst of a sample run. It is recommended that another complete filter assembly be used rather than attempting to change the filter itself. Before a new filter assembly is installed, conduct a leak check (subparagraph (A)(4)(b) of this paragraph). The total particulate weight shall include the summation of all filter assembly catches.

A single train shall be used for the entire sample run, except in cases where simultaneous sampling is required in 2 or more separate ducts, at 2 or more different locations within the same duct, or where equipment failure necessitates a change of trains. In all other situations, the use of 2 or more trains shall be subject to the approval of the commission.

Note that when 2 or more trains are used, separate analyses of the front-half and, if applicable, impinger catches from each train shall be performed, unless identical nozzle sizes were used on all trains. If identical nozzle sizes were used, the front-half catches from the individual trains may be combined, as may the impinger catches, and 1 analysis of front-half catch and 1 analysis of impinger catch may be performed. Consult with the commission for details concerning the calculation of results when 2 or more trains are used.

At the end of the sample run, turn off the coarse adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final dry-gas meter reading, and conduct a post-test leak check, as outlined in subparagraph (A)(4)(c) of this paragraph. Also, leak-check the pitot lines as described in method 2, section 3.1; the lines shall pass this leak check to validate the velocity head data.

(6) Calculation of percent isokinetic. Calculate percent isokinetic (see paragraph (vi) of this method) to determine whether the run was valid or whether another test run should be made. If there was difficulty in maintaining isokinetic rates due to source conditions, consult with the commission for possible variance on the isokinetic rates.

(B) Sample recovery. Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool.

When the probe can be safely handled, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over it to prevent losing or gaining particulate matter. Do not cap off the probe tip tightly while the sampling train is cooling down as this creates a vacuum in the filter holder and draws water from the impingers into the sample tube.

Before moving the sampling train to the cleanup site, make sure all condensed water in the probe and flexible sample lines drains into the first impinger. Disconnect all sample lines and remove the nozzle-filter set assembly from the probe. Cap all openings to prevent contamination or accidental loss of sample. Remove all excess particulate from the exterior of the nozzle-filter assembly to prevent contamination during disassembly.

Transfer the nozzle-filter set assembly and impinger set to the cleanup area. This area shall be clean and protected from the wind so that the chances of contaminating or losing the sample are minimized.

Save a portion of the solvent used for cleanup as a blank. Take 200 ml of this solvent directly from the wash bottle being used and place it in a glass sample container labeled "solvent blank."

Inspect the train prior to and during disassembly and note any abnormal conditions. Treat the samples as follows:

Containers Nos. 1, 1A. Carefully remove the filters from the filter holders and place in their identified containers. Use a pair of tweezers or clean disposable surgical gloves, or both, to handle the filters. Carefully transfer to the container any particulate matter or filter fibers, or both, that adhere to the filter holder gasket by using a dry nylon bristle brush or sharp-edged blade, or both. Seal the containers.

Container No. 2. Taking care to see that particulate on the outside of the nozzle and filter holders does not get into the sample, the testor shall carefully remove the nozzle and clean the inside surface by rinsing with solvent from a wash bottle and brushing with a nylon bristle brush. Brush until the solvent rinse shows no visible particles and then make a final rinse of the inside surface with solvent.

After ensuring that all joints have been cleaned of all extraneous material, the testor shall quantitatively remove particulate from the filter holders by rubbing the surfaces with a nylon bristle brush and rinsing with solvent. Rinse each surface 3 times, or more if needed, to remove visible particulate. Make a final rinse of the brush and filter holder set. After all solvent washings and particulate matter have been collected in the sample container, tighten the lid on the sample container so that solvent will not leak out when it is shipped to the laboratory. Mark the height of the fluid level to determine whether or not leakage occurred during transport. Label the container to clearly identify its contents.

Container No. 3. Note the color of the indicating silica gel to determine if it has been completely spent and make a notation of its condition. Transfer the silica gel from the third impinger to its original container and seal. A funnel may make it easier to pour the silica gel without spilling it. A rubber policeman may be used as an aid in removing the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use any water or other liquids to transfer the silica gel. If a balance is available in the field, follow the procedure for container No. 3 in subparagraph (C) of this paragraph.

Impinger water. Treat the impingers as follows: Make a notation of any color or film in the liquid catch. Measure the liquid that is in the first 2 impingers to within ±1 ml by using a graduated cylinder or by weighing it to within ±1.0 g by using a balance if one is available. Record the volume or weight of liquid present. This information is required to calculate the moisture content of the effluent gas.

Discard the liquid after measuring and recording the volume or weight, unless analysis of the impinger catch is required (see paragraph (ii)(A)(7) of this method).

If a different type of condenser is used, measure the amount of moisture condensed either volumetrically or gravimetrically.

Whenever possible, containers shall be shipped in a manner that keeps them upright at all times

(C) Analysis. Record the data required on a sheet such as the one shown in figure 106. Handle each sample container as follows:

Container Nos. 1, 1A. Analyze and report each filter separately. Transfer the filter and any loose particulate from the sample container to a tared-glass weighing dish. Dry the filter in an oven at 105 degrees Centigrade (220 degrees Fahrenheit) for a minimum of 2 hours, cool for at least 1 hour in a desiccator containing anhydrous calcium sulfate and weigh and record its weight to the nearest 0.1 mg. During the weighing the filter shall not be exposed to the laboratory atmosphere for a period greater than 2 minutes or a relative humidity above 50%. Procedures, other than those specified, that account for relative humidity effects may be used, subject to the approval of the commission. The method used for drying and weighing of filters shall be consistent before and after the test.

Container No. 2. Note the level of liquid in the container and confirm on the analysis sheet whether or not leakage occurred during transport. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the commision, to correct the final results. Measure the liquid in this container either volumetrically to ±1 ml or gravimetrically to ±1.0 g. Transfer the contents to a tared 250 ml beaker and evaporate to dryness either at ambient temperature and pressure for acetone or at 95 degrees Centigrade (203 degrees Fahrenheit) in an oven for distilled water. Then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) in an oven for 2 to 3 hours. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

Container No. 3. Weigh the spent silica gel, or silica gel plus impinger, to the nearest 0.5 g using a balance. This step may be conducted in the field.

"Solvent blank" container. Measure solvent in this container either volumetrically or gravimetrically. Transfer the contents to a tared 250 ml beaker and evaporate to dryness either at ambient temperature and pressure for acetone or at 95 degrees Centigrade (203 degrees Fahrenheit) in an oven for distilled water. Then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) in an oven for 2 to 3 hours. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

If acetone is used, the contents of Container No. 2, as well as the acetone blank container, may be evaporated at temperatures higher than ambient. If evaporation is done at an elevated temperature, the temperature shall be closely supervised, and the contents of the beaker shall be swirled occasionally to maintain an even temperature. Use extreme care, as acetone is highly flammable and has a low flash point.

(v) Calibration.

Maintain a laboratory log of all calibrations.

(A) Probe nozzle. Probe nozzles shall be calibrated before their initial use in the field. Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in.). Make 3 separate measurements using different diameters each time and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in.). When nozzles become nicked, dented, or corroded, they shall be reshaped, sharpened, and recalibrated before use. Each nozzle shall be permanently and uniquely identified.

(B) Pitot tube. The type S pitot tube assembly shall be calibrated according to the procedure outlined in section 4 of method 2.

(C) Metering system. Before its initial use in the field, the metering system shall be calibrated according to the procedure outlined in APTD-0576. Instead of physically adjusting the dry-gas meter dial readings to correspond to the wet-test meter readings, calibration factors may be used to mathematically correct the gas meter dial readings to the proper values. Before calibrating the metering system, it is suggested that a leak check be conducted. For metering systems having diaphram or rotary pumps, the normal leak check procedure will not detect leakages within the pump. For these cases, the following leak check procedure is suggested: Make a 10-minute calibration run at 0.00057 m^3/min (0.02 cmf); at the end of the run, take the difference of the measured wet-test meter and dry-gas meter volumes; divide the difference by 10 to get the leak rate. The leak rate shall not exceed 0.00057 m^3/min (0.02 cmf).

After each field use, the calibration of the metering system shall be checked by performing 3 calibration runs at a single, intermediate orifice setting, based on the previous field test, with the vacuum set at the maximum value reached during the test series. To adjust the vacuum, insert a valve between the wet-test meter and the inlet of the metering system. Calculate the average value of the calibration factor. If the calibration has changed by more than 5%, recalibrate the meter over the full range of orifice settings, as outlined in APTD-0576.

Alternatively, a spirometer may be substituted for a wet-test meter in the above mentioned calibration procedures.

Alternative procedures, such as using the orifice meter coefficients, may be used, subject to the approval of the commission. If the dry-gas meter coefficient values obtained before and after a test series differ by more than 5%, the test series shall be performed using whichever meter coefficient value (before or after) gives the lower value of total sample volume.

(D) Temperature gauges. Use the procedure in section 4.3 of method 2 to calibrate instack temperature gauges. Dial thermometers, such as those used for the dry-gas meter and condenser outlet, shall be calibrated against mercury-in-glass thermometers.

(E) Leak check of metering system shown in figure 102. That portion of the sampling train from the pump to the orifice meter shall be leak-checked prior to initial use and after each shipment. Leakage after the pump will result in less volume being recorded than is actually sampled. The following procedure is suggested (see figure 107): Close the main valve on the meter box. Insert a 1-hole rubber stopper with rubber tubing attached into the orifice exhaust pipe. Disconnect and vent the low side of the orifice manometer. Close off the low side orifice tap. Pressurize the system to 13 to 18 cm (5 to 7 in.) water column by blowing into the rubber tubing. Pinch off the tubing and observe the manometer for 1 minute. A loss of pressure on the manometer indicates a leak in the meter box; leaks, if present, shall be corrected.

(F) Barometer. Calibrate against a mercury barometer.

(vi) Calculations.

When carrying out calculations, retain at least 1 extra decimal figure beyond that of the acquired data. Round off figures after the final calculation. Other forms of the equations may be used if they give equivalent results.

(A) Nomenclature.

An = Cross -sectional area of nozzle, m^2 (ft^2).

A = Cross-sectional area of stack or flue at the point of sampling, ft^2.

Bws = Water vapor in the gas stream, proportion by volume, expressed as a fraction.

Bwi = Percent water vapor in gas entering source particulate control device, determined by method 4.

Bwo = Percent water vapor in gas exiting source particulate control device.

Ca = Wash blank residue concentration, mg/g.

Cs = Concentration of particulate matter in stack gas, moisture excluded, pounds of actual stack gas.

CsD = Concentration of particulate matter in stack gas, moisture excluded, pounds per 1000 pounds of dry stack gas.

Cs5o = Concentration of particulate matter corrected to 50% excess air, pounds per 1000 pounds of stack gas.

Cs5oD = Concentration of particulate matter corrected to 50% excess air, excluding any water addition from a collector, pounds per 1000 pounds of stack gas.

E = Mass emission rate of particulate, lb/hr.

F5oD = Concentration conversion factor to 50% excess air, excluding any moisture added to exhaust gas by pollution collection system.

FD = Concentration conversion factor to dry basis, excluding any water in the stack gas.

I = Percent of isokinetic sampling.

La = Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to 0.0057 m^3/min (0.02 cfm) or 4% of the average sampling rate, whichever is less.
Li = Individual leakage rate observed during the leak check conducted prior to the "ith" component change (i 1,2,3 . . . . n), m^3/min (cfm).
Lp = Leakage rate observed during the post-test leak check, m^3/min (cfm).
Md = Molecular weight of dry stack gas, g/g mole (lb/lb-mole), calculated by method 3, equation 3-2, using data from integrated method 3.
mn = Total amount of particulate matter collected, mg.
Mw = Molecular weight of water, 18.0 g/g-mole (18.0 lb/lb-mole).
ma = Mass of residue of solvent after evaporation, mg.
mg = Total weight of gas samples through nozzle, lb.
Pbar = Barometric pressure at the sampling site, mm Hg (in. Hg).
Ps = Absolute stack gas pressure.
Pstd = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).
R = Ideal gas constant, 0.06236 mm Hg-m^3/°K-g-mole (21.85 in. Hg-ft^3/°R-lb-mole).
Tm = Absolute average dry-gas meter temperature (see figure 104), °K (°R).
Ts = Absolute average stack gas temperature (see figure 104), °K (°R).
Tstd = Standard absolute temperature, 294.1°K (530°R).
Va = Volume of solvent blank, ml.
Vaw = Volume of solvent used in wash, ml.
Vlc = Total volume of liquid collected in impingers and silica gel (see figure 106), ml.
Vm = Volume of gas sample as measured by the dry-gas meter, dcm (dcf).
Vm(std) = Volume of gas sample measured by the dry-gas meter, corrected to standard conditions, dscm (dscf).
Vw(std) = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf).
Vs = Stack gas velocity, calculated by method 2, equation 2-9, using data obtained from method 5, m/sec (ft/sec).
Wa = Weight of residue in solvent wash, mg.
Y = Dry-gas meter calibration factor.
ΔH = Average pressure differential across the orifice meter (see figure 104), mm H_2O (in H_2O).
%O_2 = Percent oxygen in stack gas by volume (dry basis).
%N_2 = Percent nitrogen in stack gas by volume (dry basis).
pa = Density of solvent, mg/ml.
ps(std) = Density of all sampled gas at standard conditions, lb/ft^3.
pw = Density of water, 0.9982 g/ml (0.002201 lb/ml).
θ = Total sample time, min.
θ_1 = Sample time, interval, from the beginning of a run until the first component change, min.
θ_i = Sampling time interval, between 2 successive component changes, beginning with the interval between the first and second changes, min.
θp = Sampling time interval, from the final (n^{th}) component change until the end of the sampling run, min.

13.6 = Specific gravity of mercury.
60 = Sec/min.
100 = Conversion to percent.
386.9 = Cubic feet per lb-mole of ideal gas at standard conditions.
453.9 = Conversion of pounds to grams.
3600. = Conversion of hours to sec.
1000 = Conversion of 1000 lb units to lb units.

(B) Average the dry-gas meter temperature and average the orifice pressure drop. See data sheet (figure 5-2).

(C) Dry gas volume. Correct the sample volume measured by the dry-gas meter to standard conditions (21.11 degrees Centigrade, 760 mm Hg or 70 degrees Fahrenheit, 29.92 in. Hg) by using equation 5-1.

$$\mathrm{Vm(std)} = \frac{\mathrm{VmY\ T\ std\ (Pbar\ \&\ \Delta H/13.6)}}{\mathrm{Tm\ P\ std}}$$

$$= \mathrm{K1VmY}\ \frac{\mathrm{Pbar\ \&\ (\Delta H/13.6)}}{\mathrm{Tm}} \qquad \text{equation 5-1}$$

where:
$\mathrm{K1} = 0.3869\ ^{\circ}\mathrm{K/mm\ Hg}$ for metric units.
$= 17.71\ ^{\circ}\mathrm{R/in.\ Hg}$ for English units.

Equation 5-1 may be used as written. However, if the leakage rate observed during any of the mandatory leak checks (i.e., the post-test leak check or leak checks conducted prior to component changes) exceeds La, equation 5-1 shall be modified as follows:

(1) Case I. No component changes made during sampling run. In this case, replace Vm in equation 5-1 with the expression;

$\mathrm{Vm} - (\mathrm{Lp} - \mathrm{La})\theta$

(2) Case II. One or more component changes made during the sampling run. In this case, replace Vm in equation 5-1 by the expression:

$$\mathrm{Vm} - (L_1 - \mathrm{La})\ \theta_1 - \sum_{i=2}^{n} (L_i - L_a)\ \theta_i - (L_p - L_a)\ \theta_p$$

and substitute only for those leakage rates (L_i or L_p) that exceed L_a.

(D) Volume of water vapor.

$\mathrm{Vw(std)} = \mathrm{Vlc\ (pw/Mw)\ (RTstd/Pstd)} = K_2\ V_{1c}$ equation 5-2

where:
$K_2 = 0.001338\ \mathrm{m^3/ml}$ for metric units.

(E) Moisture content.

$\mathrm{Bws} = \mathrm{Vw(std)/(Vm(std + Vw(std))}$ equation 5-3

In saturated or water droplet--laden gas streams, 2 calculations of the moisture content of the stack gas shall be made: 1 from the impinger analysis (equation 5-3), and a second from the assumption of saturated conditions. The lower of the 2 values of Bws shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in the note of section 1.2 of method 4. For the purpose of this method, the average stack gas temperature from figure 104 may be used to make the determination, if the accuracy of the instack temperature sensor is ±1 degree Centigrade (2 degrees Fahrenheit).

(F) Solvent blank concentration.

$\mathrm{ca} = \mathrm{ma/(Va\ pa)}$ equation 5-4

(G) Solvent wash blank.

$\mathrm{Wa} = \mathrm{Ca\ Vaw\ pa}$ equation 5-5

(H) Total particulate weight. Determine the total particulate catch from the sum of the weights obtained from containers 1, 1A, and 2 less the wash solvent blank (see figure 106).

Refer to paragraph (iv)(A)(5) of this method to assist in the calculation of results involving 2 or more pairs of filters or 2 or more sampling trains.

(I) Sampled gas density. Determine the density of the gas sampled from the stack, at standard conditions (lb/ft^3).

$$ps(std) = (MD\ (1-Bws) + Mw\ Bws)/386.9 \qquad \text{equation 5-6}$$

(J) Total weight of gas sampled (lbs).

$$mg = (vm(std) + Vw(std))\ ps(std) \qquad \text{equation 5-7}$$

(K) Particulate concentration (lbs/1000 lbs).

$$Cs = mn/(453.6\ mg) \qquad \text{equation 5-8}$$

(L) Excess air and moisture correction factors.

(1) Correction factor to 50% excess air for those sources with or without any particulate collector where no increase in moisture content of the exhaust gas occurs after the process and before the point of sampling.

$$F50 = \frac{Md + 18\ Bwo/(100-Bwo)}{0.1826\ \%N2 - 2.0592\ \%02 + Md + 18Bwo/(100-Bwo)} \qquad \text{equation 5-9}$$

(2) Correction factor to 50% excess air for those sources with a wet collection device (scrubber) that increases the moisture content of the exhaust gas after the process and before the point of sampling.

$$F50D = \frac{Md + 18\ Bwo/(100\ Bwo)}{0.1826\ \%N2 - 2.0592\ \%\ 02 + Md + 18\ Bwi/(100-Bwi)} \qquad \text{equation 5-10}$$

(3) Correction factor to convert the actual concentration, Cs to dry conditions.

$$F = \frac{Md + 18\ Bwo/(100-Bwo)}{Md}$$

(M) Converted particulate concentrations, where applicable under the commission's rules or permit.

$$Cs50 = Cs\ F50 \qquad \text{equation 5-12}$$

$$Cs50D = Cs\ F50D \qquad \text{equation 5-13}$$

$$CsD = Cs\ FD \qquad \text{equation 5-14}$$

(N) Mass emission rate (lb/hr.).

$$E = \frac{360\ A\ Vs\ Cs\ Ps\ Tstd\ ps(std)}{1000\ \ Ts\ Pstd}$$

$$= K3\ A\ Vs\ Cs\ Ps\ ps(std)/Ts$$

where:

K3 = 63.77 for English units.

(O) Isokinetic variation.

(1) Calculation from raw data.

$$I = \frac{100\ Ts\ (k4\ Vlc = (Vm/Tm)\ (Pbar + \Delta H/13.6))}{60\ \theta\ Vs\ Ps\ An} \qquad \text{equation 5-16}$$

where:

K4 = 0.003458 mm Hg - m^{3}ml - ^{o}K for metric units.

= 0.002672 in. Hg - ft^3/ml - ^{o}R for English units.

(2) Calculation from intermediate values.

$$I = \frac{Ts\ Vm(std)\ Pstd\ 100}{Tstd\ Vs\ \theta\ An\ Ps\ 60(1 - Bws)} \qquad \text{equation 5-17}$$

$$= K5 \frac{Ts\ Vm(std)}{Ps\ Vs\ An\ \theta\ (1-Bws)}$$

where:

K5 = 4.307 for metric units.

= 0.09409 for English units.

(P) Acceptable results. If 90% ≤ I ≤ 110%, the results are acceptable. If the results are low in comparison to the standard and I is beyond the acceptable range, or if I is less than 90%, the commission may opt to accept the results. Otherwise, reject the results and repeat the test.

(vii) Bibliography.

(A) Federal Register, Volume 42, NO. 160, Part 160, Chapter 1, Title 40,Appendix A. Method 5, August 18, 1977.

(B) Martin, Robert M. Construction Details of Isokinetic Source Sampling Equipment. Environmental Protection Agency. Research Triangle Park, N.C. APTD-0581. April, 1971.

(C) Rom, Jerome J., Maintenance, Calibration, and Operation of Isokinetic Source Sampling Equipment. Environmental Protection Agency. Research Triangle Park, N.C. APTD-0576. March, 1972.

(D) Shigehara, R.T. "Adjustments in the EPA Nomograph for Different Pitot Tube Coefficients and Dry Molecular Weights." Stack Sampling News, 2:4 - 11, October, 1974.

(E) Guidelines for Source Testing of Particulate. Michigan Department of Natural Resources, Air Quality Division. June 1, 1977.

(c) Method 5C - Outstack filtration method. Method 5C reads as follows:

(i) Principle and applicability.

(A) Principle. Particulate matter is withdrawn isokinetically from the source and collected on solid filtering media maintained at a temperature in the range of 120 ± 14 degrees Centigrade (248 ± 25 degrees Fahrenheit) or such other temperature as specified by the commission's rules or a permit condition, or as approved by the commission for a particular application. The particulate mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after removal of uncombined water.

(B) Applicability. This method is applicable for the determination of particulate emissions from stationary sources as specifically provided for in the commission's rules, a permit to install, or a permit to operate.

(ii) Apparatus.

(A) Sampling train. A schematic of the sampling train used in this method is shown in figure 103. Construction details for many, but not all, of the train components are given in APTD-0581 (paragraph (vii)(B) of this method). For changes from the APTD-0581 document and for allowable modifications to figure 103, consult with the commission.

The operating and maintenance procedures for many, but not all, of the sampling train are described in APTD-0576 (paragraph (vii)(C) of this method). Since correct usage is important in obtaining valid results, all users shall read APTD-0576 and adopt the applicable operating and maintenance procedures outlined in it, unless otherwise specified herein. The sampling train consists of the following components:

(1) Probe nozzle. Stainless steel (316) or glass with sharp, tapered leading edge. The angle of taper shall be less than 30 degrees and the taper shall be on the outside to preserve a constant internal diameter. The probe nozzle shall be of the button-hook design, unless otherwise specified by the commission. If made of stainless steel, the nozzle shall be constructed from seamless tubing. Other materials of construction may be used, subject to the approval of the commission.

A range of nozzle sizes suitable for isokinetic sampling shall be available, e.g., 0.32 to 1.27 cm. (1/8 to 1/2 in.) - or larger if higher volume sampling trains are used - inside diameter (ID) nozzles in increments of 0.16 cm (1/16 in.). Each nozzle shall be calibrated according to the procedures outlined in paragraph (v) of this method.

(2) Probe liner. Borosilicate or quartz glass tubing with a heating system capable of maintaining a gas temperature at the exit end during sampling of 120 ± 14 degrees Centigrade (248 ± 25 degrees Fahrenheit), another temperature as specified by the commission's rules, or a temperature approved by the commission for a particular application. The tester may opt to operate the equipment at a temperature lower than that specified. Since the actual temperature at the outlet of the probe is not usually monitored during sampling, probes constructed according to APTD-0581 which utilize the calibration curves of APTD-0576, or calibrated according to the procedure outlined in APTD-0576, are acceptable.

Either borosilicate or quartz glass probe liners may be used for stack temperatures up to about 480 degrees Centigrade (900 degrees Fahrenheit); quartz liners shall be used for temperatures between 480 and 900 degrees Centigrade (900 and 1,650 degrees Fahrenheit). Both types of liners may be used at higher temperatures than specified for short periods of time, subject to the approval of the commisison. The softening temperature for borosilicate is 820 degrees Centigrade (1,508 degrees Fahrenheit) and for quartz it is 1,500 degrees Centigrade (2,732 degrees Fahrenheit).

Whenever practical, every effort shall be made to use borosilicate or quartz glass probe liners. Alternatively, metal liners, such as 316 stainless steel, Incoloy 825,[2] or other corrosion-resistant materials made of seamless tubing, may be used, subject to the approval of the commission.

(3) Pitot tube. Type S, as described in section 2.1 of method 2, or other device approved by the commission. The pitot tube shall be attached to the probe, as shown in figure 103, to allow constant monitoring of the stack gas velocity. The impact (high pressure) opening plane of the pitot tube shall be even with or above the nozzle entry plane (see method 2, figure 2-6b) during sampling. The type S pitot tube assembly shall have a known coefficient, determined as outlined in section 4 of method 2.

(4) Differential pressure gauge. Incline manometer or equivalent devices (2), as described in section 2.2 of method 2. One manometer shall be used for velocity head (Δp) readings, and the other shall be used for orifice differential pressure readings.

(5) Filter holders. Two separate filter holders in series or 1 filter holder with separate filter supports and seals for 2 filters. One filter holder with 2 filters held in contact with each other is not acceptable. Materials of construction may be stainless steel (316), glass, teflon, or such other material approved by the commission.

(6) Filter heating system. Any heating system capable of maintaining a temperature around the filter holder during sampling of 120 ± 14 degrees Centigrade (248 ± 25 degrees Fahrenheit), another temperature as specified by the commission's rules or a permit condition, or a temperature approved by the commission for a particular application. Alternatively, the tester may opt to operate the equipment at a temperature lower than that specified. A temperature gauge capable of measuring temperature to within 3 degrees Centigrade (5.4 degrees Fahrenheit) shall be installed so that the temperature around the filter holders can be regulated and monitored during sampling. Heating systems other than the one shown in APTD-0581 may be used.

(7) Condenser. The following system shall be used to determine the stack gas moisture content: Three impingers connected in series with leak-

free ground glass fittings or any similar leak-free noncontaminating fittings. All impingers shall be of the Greenburg-Smith design and shall be modified by replacing the tip with a 1.3 cm (1/2 in.) ID glass tube extending to about 1.3 cm (1/2 in.) from the bottom of the flask. Modifications, such as using flexible connections between the impingers or using materials other than glass, are permitted subject to the approval of the commission's staff. The first impinger shall contain a known quantity of water (paragraph (iv)(A)(3) of this method), the second shall be empty, and the third shall contain a known weight of silica gel or equivalent desiccant.

Alternatively, any system that cools the sample gas stream and allows measurement of the water condensed and moisture leaving the condenser, each to within 1 ml or 1 g, may be used subject to the approval of the commission. In any case, the means for measuring the moisture leaving the condenser shall be by passing the sample gas stream through a tared silica gel, or equivalent desiccant, trap with exit gases kept below 20 degrees Centigrade (68 degrees Fahrenheit) and determining the weight gain.

If a determination of the particulate matter collected in the impingers is required by the commission's rules, a permit to install, or a permit to operate, the impinger system described in paragraph (ii)(a)(7) of this method shall be used, without modification. Contact the commission as to the sample recovery and analysis of the impinger contents.

(8) Metering system. Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 3 degrees Centigrade (5.4 degrees Fahrenheit), dry-gas meter capable of measuring volume to within 2%, and related equipment as shown in figure 103. Other metering systems capable of maintaining sampling rates within 10% of isokinetic and capable of determining sample volumes to within 2% may be used, subject to the approval of the commission. When the metering system is used in conjunction with a pitot tube, the system shall enable checks of isokinetic rates.

Sampling trains utilizing metering systems designed for higher flow rates than those described in APTD-0581 or APTD-0576 may be used if the specifications of this method are met.

(9) Barometer. Mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in. Hg). In many cases, the barometric reading may be obtained from a nearby national weather service station. When obtained from this source, the station value, which is the absolute barometric pressure, shall be requested and an adjustment for elevation differences between the weather station and sampling point shall be applied at a rate of minus 2.5 mm Hg (0.1 in. Hg) per 30 m (100 ft.) elevation increase or vice versa for elevation decrease.

(10) Gas density determination equipment. Temperature sensor and pressure gauge, as described in sections 2.3 and 2.4 of method 2, and gas analyzer, if necessary, as described in method 3. The temperature sensor shall, preferably, be permanently attached to the pitot tube or sampling probe in a fixed configuration such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal. Alternatively, the sensor may be attached just prior to use in the field. Note, however, that if the temperature sensor is attached in the field, the sensor shall be placed in an interference-free arrangement with respect to the type S pitot tube openings (see method 2, figure 2.7). As a second alternative, if a difference of not more than 1% in the average velocity measurement is to be introduced, the temperature gauge need not be attached to the

probe or pitot tube. This alternative is subject to the approval of the commission.

(B) Sample recovery. The following items are needed:

(1) Probe-liner and probe-nozzle brushes. Nylon bristle brushes with stainless steel wire handles. The probe brush shall have extensions, at least as long as the probe, made of stainless steel, nylon, teflon, or similarly inert material. The brushes shall be properly sized and shaped to brush out the probe liner and nozzle.

(2) Wash bottles--2. Glass wash bottles are recommended; polyethylene wash bottles may be used at the option of the tester. It is recommended that acetone not be stored in polyethylene bottles for longer than a month.

(3) Glass sample storage containers. Chemically resistant, borosilicate glass bottles, for acetone washes, 500 ml or 1000 ml. Screw cap liners shall either be rubber-backed teflon or shall be constructed so as to be leak-free and resistant to chemical attack by acetone. Narrow-mouth glass bottles have been found to be less prone to leakage. Alternatively, polyethylene bottles may be used.

(4) Filter containers. Glass, polyethylene, or aluminum tube containers, unless otherwise specified by the commission.

(5) Graduated cylinder and/or balance. To measure condensed water to within 1 ml or 1 g. Graduated cylinders shall have subdivisions of not more than 2 ml. Most laboratory balances are capable of weighing to the nearest 0.5 g or less. Any of these balances are suitable for use here and in subparagraph (C)(4) of this paragraph.

(6) Plastic storage containers. Airtight containers to store silica gel.

(7) Funnel and rubber policeman. To aid in the transfer of silica gel to container; not necessary if silica gel is weighed in the field.

(8) Funnel. Glass or polyethylene, to aid in sample recovery.

(C) Analysis. The following equipment is needed for analysis:

(1) Glass weighing dishes.

(2) Desiccator.

(3) Analytical balance. To measure to within 0.1 mg.

(4) Balance. To measure to within 0.5 mg.

(5) Beakers. 250 ml.

(6) Hygrometer. To measure the relative humidity of the laboratory environment.

(7) Temperature gauge. To measure the temperature of the laboratory environment.

(iii) Reagents.

(A) Sampling. The reagents used in sampling are as follows:

(1) Filters. Two outstack filters may be any combination of alundum ceramic thimble filters, type RA-98 or glass fiber filters, type A without organic binder. The size of such filters shall allow proper sampling rates to maintain isokinetics using the nozzle sizes specified in paragraph (ii)(A)(1) of this method.

Alternatively, other types of filters may be used, subject to approval of the commission.

(2) Silica gel. Indicating type, 6 to 16 mesh. If previously used, dry at 175 degrees Centigrade (350 degrees Fahrenheit) for 2 hours. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used, subject to the approval of the commission.

(3) Water. When analysis of the material caught in the impingers is required, distilled water shall be used. Run blanks prior to field use to eliminate a high blank on test samples.

(4) Crushed ice.

(5) Stopcock grease. Acetone-insoluble, heat-stable silicone grease. This is not necessary if screw-on connectors with teflon sleeves, or equivalent, are used. Alternatively, other types of stopcock grease may be used, subject to the approval of the commission.

(B) Sample recovery. Washing solvent. Either acetone or distilled water may be used for sample recovery. If acetone is used for washing solvent, then reagent grade, less than 0.001% residue, in glass bottles is required. Acetone from metal containers generally has a high residue blank and shall not be used. Suppliers sometimes transfer acetone to glass bottles from metal containers; thus, acetone blanks shall be run prior to field use and only acetone with low blank values (less than 0.001%) shall be used. In no case shall a blank value of more than 0.001% of the weight of acetone used be subtracted from the sample weight.

If distilled water is used for washing solvent, use distilled water with less than 0.001% residue. Run blanks prior to field use to eliminate a high blank on test samples.

(C) Analysis. Two reagents are required for the analysis:

(1) Solvent. Same as subparagraph (B) of this paragraph for quantitative transfer.

(2) Desiccant. Anhydrous calcium sulfate, indicating type. Alternatively, other types of desiccants may be used, subject to the approval of the commission.

(iv) Procedure.

(A) Sampling. The complexity of this method is such that, in order to obtain reliable results, testers shall be trained and experienced with the test procedures.

(1) Pretest preparation. All the components shall be maintained and calibrated according to the applicable procedures described in APTD-0576, unless otherwise specified herein.

Weigh several 200 to 300 g portions of silica gel in airtight containers to the nearest 0.5 g. Record the total weight of the silica gel plus container on each container. As an alternative, the silica gel need not be preweighed, but may be weighed directly in its impinger or sampling holder just prior to train assembly.

Check filters visually against light for irregularities, flaws, pinhole leaks, or cracks. Label filters of the proper size on the back side using numbering machine ink. As an alternative, label the shipping containers (paragraph (ii)(B)(4) of this method) and keep the filters in these containers at all times, except during sampling and weighing.

Dry the filters in an oven at 105 degrees Centigrade (220 degrees Fahrenheit) for a minimum of 2 hours, cool for at least 1 hour in a desiccator containing anhydrous calcium sulfate, and individually weight and record their weights to the nearest 0.1 mg. During the weighing, the filters shall not be exposed to the laboratory atmosphere for a period of more than 2 minutes and a relative humidity above 50%. Procedures, other than those specified, that account for relative humidity effects may be used, subject to the approval of the commission.

(2) Preliminary determinations. Select the sampling site and the minimum number of sampling points according to method 1 or as specified by the

commission. Determine the stack pressure, temperature, and the range of velocity heads using method 2; it is recommended that a leak check of the pitot lines (see method 2, section 3.1) be performed. Determine the moisture content using approximation method 4, or its alternatives, for the purpose of making isokinetic sampling rate settings. Determine the stack gas dry molecular weight, as described in method 2, section 3.6; if integrated method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as, the particulate sample run.

Select a nozzle size based on the range of velocity heads so that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates. During the run, do not change the nozzle size. Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see section 2.2 of method 2).

Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, consider sampling from opposite sides of the stack to reduce the length of probes.

Select a total sampling time greater than or equal to the minimum total sampling time specified in the test procedures for the specific industry so that (1) the sampling time per point is not less than 5 min., unless approved by the commission (or some greater time interval as specified by the commission), and (2) the sample volume taken, corrected to standard conditions, exceeds the required minimum total gas sample volume. The latter is based on an approximate average sampling rate.

It is recommended that the number of minutes sampled at each point be an integer or an integer plus 1/2 minute to avoid timekeeping errors.

In some circumstances, such as in batch cycles, it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas sample volumes. In these cases, the commission's approval shall first be obtained.

(3) Preparation of collection train. During preparation and assembly of the sampling train, keep all openings where contamination can occur covered until just prior to assembly or until sampling is about to begin.

Place 100 ml of water in the first impinger, leave the second impinger empty, and transfer approximately 200 to 300 g of preweighed silica gel from its container to the third impinger. More silica gel may be used, but care should be taken to ensure that it is not entrained and carried out from the impinger during sampling. Place the container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

Using tweezers or clean disposable surgical gloves, place a labeled (identified) and weighed filter in the filter holder. Be sure that the filter is properly centered and the gasket properly placed so as to prevent the sample gas stream from circumventing the filter. Check the filter for tears after assembly is completed.

When glass liners are used, install the selected nozzle using a Viton A O-ring when stack temperatures are less than 260 degrees Centigrade (500 degrees Fahrenheit) and an asbestos string gasket when temperatures are higher. See APTD-0576 for details. Other connecting systems using either 310 stainless steel or teflon ferrules may be used. When metal liners are used, install the nozzle in the same manner as for glass liners or by a leak-free direct mechanical connection. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

Set up the train as in figure 103. If necessary, use a very light coat of silicone grease on all ground glass joints. Grease only the outer portion (see APTD-0576) to avoid the possibility of contamination by the silicone grease.

Place crushed ice around the impingers.

(4) Leak check procedures.

(a) Pretest leak check. A pretest leak check is strongly recommended, but not required, to prevent invalid sampling and wasted time. If the tester opts to conduct the pretest leak check, the following procedure shall be used:

After the sampling train has been assembled, turn it on and set the filter and probe heating systems at the desired operating temperatures. Allow time for the temperatures to stabilize. If a Viton A O-ring or other leak-free connection is used in assembling the probe nozzle to the probe liner, leak-check the train at the sampling site by plugging the nozzle and pulling a 380 mm Hg (15 in. Hg) vacuum. A lower vacuum may be used, if it is not exceeded during the test.

If an asbestos string is used, do not connect the probe to the train during the leak check. Instead, leak-check the train by first plugging the inlet to the filter holder (cyclone, if applicable) and pulling a 380 mm Hg (15 in. Hg) vacuum. A lower vacuum may be used if it is not exceeded during the test. Then connect the probe to the train and leak-check at about 25 mm Hg (1 in. Hg) vacuum; alternatively, the probe may be leak-checked with the rest of the sampling train, in 1 step, at 380 mm Hg (15 in. Hg) vacuum. Leakage rates in excess of 4% of the average sampling rate or 0.00057 m 3/min (0.02 cfm), whichever is less, are unacceptable.

The following leak check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with the bypass valve fully open and the coarse adjust valve completely closed. Partially open the coarse adjust valve and slowly close the bypass valve until the desired vacuum is reached. Do not reverse the direction of the bypass valve; this will cause water to back up into the filter holder. If the desired vacuum is exceeded, either leak-check at this higher vacuum or end the leak check and start over.

When the leak check is completed, first slowly remove the plug from the inlet to the probe, filter holder, or cyclone (if applicable) and immediately turn off the vacuum pump. This prevents the water in the impingers from being forced backward into the filter holder and prevents silica gel from being entrained backward into the third impinger.

(b) Leak checks during sample run. If, during the sampling run, a component (such as a filter assembly or impinger) change becomes necessary, a leak check shall be conducted immediately before the change is made. The leak check shall be done according to the procedure outlined in subparagraph (A)(4)(a) of this paragraph, except that it shall be done at a vacuum equal to or greater than the maximum value recorded up to that point in the test. If the leakage rate is found to be not more than 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate, whichever is less, the results are acceptable and no correction need be applied to the total volume of dry gas metered; if, however, a higher leakage rate is obtained, the tester shall either record the leakage rate and plan to correct the sample volume, as shown in paragraph (vi)(C) of this method, or shall void the sampling run.

Immediately after component changes, leak checks are optional; if such leak checks are done, the procedure outlined in subparagraph (A)(4)(a) of this paragraph shall be used.

(c) Post-test leak check. A leak check is mandatory at the conclusion of each sampling run. The leak check shall be done in accordance with the procedures outlined in subparagraph (A)(4)(a) of this paragraph, except that it shall be conducted at a vacuum equal to or greater than the maximum value reached during the sampling run. If the leakage rate is found to be not more than 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate, whichever is less, the results are acceptable and no correction need be applied to the total volume of dry gas metered. If, however, a higher leakage rate is obtained, the tester shall either record the leakage rate and correct the sample volume, as shown in paragraph (vi)(c) of this method, or shall void the sampling run.

(5) Particulate train operation. During the sampling run, maintain an isokinetic sampling rate that is within 10% of true isokinetic, unless otherwise specified by the commission.

For each run, record the data required on a data sheet such as the one shown in figure 104. Be sure to record the initial dry-gas meter reading. Record the dry-gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made, before and after each leak check, and when sampling is halted. Take other readings required by figure 104 at least once at each sample point during each time increment, and take additional readings when significant changes (20% variation in velocity head readings) necessitate additional adjustments in flow rate. Level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

Clean the portholes prior to the test run to minimize the chance of sampling deposited material. To begin sampling, remove the nozzle cap and verify that the pitot tube and probe are properly positioned. Position the nozzle at the first traverse point with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs that aid in the rapid adjustment of the isokinetic sampling rate without excessive computations are available. These nomographs are designed for use when the type S pitot tube coefficient is 0.85 ± 0.02 and the stack gas equivalent density (dry molecular weight) is equal to 29 ± 4. APTD-0576 details the procedure for using the nomographs. If C_p and M_d are outside the above stated ranges, do not use the nomographs unless appropriate steps (see paragraph (vii)(D) of this method) are taken to compensate for the deviations.

When the stack is under significant negative pressure (height of impinger stem), take care to pull low flow when inserting the probe into the stack to prevent water from backing into the sample tubing and to avoid pulsation through the filter and possible loss of materials.

When the probe is in position, block off the openings around the probe and porthole to prevent unrepresentative dilution of the gas stream.

Traverse the stack cross section, as required by method 1 or as specified by the commission, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the portholes; this minimizes the chance of extracting deposited material.

During the test run, add more ice and, if necessary, salt to maintain a temperature of less than 20 degrees Centigrade (68 degrees Fahrenheit) at the condenser/silica gel outlet. Also, periodically check the level and zero of the manometer.

If the pressure drop across the filter becomes too high and makes isokinetic sampling difficult to maintain, the filter may be replaced in the midst of a sample run. It is recommended that another complete filter assembly be used rather than attempting to change the filter itself. Before a new filter assembly is installed, conduct a leak check (see subparagraph (A)(4)(b) of this paragraph). The total particulate weight shall include the summation of all filter assembly catches.

A single train shall be used for the entire sample run, except in cases where simultaneous sampling is required in 2 or more separate ducts, at 2 or more different locations within the same duct, or where equipment failure necessitates a change of trains. In all other situations, the use of 2 or more trains shall be subject to the approval of the commission.

Note that when 2 or more trains are used, separate analyses of the front-half catches from the individual trains may be combined, as may the impinger catches, and 1 analysis of the front-half catch and 1 analysis of impinger catch may be performed. Consult with the commission for details concerning the calculation of results when 2 or more trains are used.

At the end of the sample run, turn off the coarse adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final dry-gas meter reading, and conduct a post-test leak-check, as outlined in subparagraph (A)(4)(c) of this paragraph. Also, leak-check the pitot lines as described in method 2, section 3.1; the lines shall pass this leak check to validate the velocity head data.

(6) Calculation of percent isokinetic. Calculate percent isokinetic (see paragraph (vi) of this method) to determine whether the run was valid or whether another test run should be made. If there was difficulty in maintaining isokinetic rates due to source conditions, consult with the commission for possible variance on the isokinetic rates.

(B) Sample recovery. Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool.

When the probe can be safely handled, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over it to prevent losing or gaining particulate matter. Do not cap off the probe tip tightly while the sampling train is cooling down as this creates a vacuum in the filter holder and draws water from the impingers into the filter holder.

Before moving the sample train to the cleanup site, remove the probe from the sample train, wipe off the silicone grease, and cap the open outlet of the probe. Be careful not to lose any condensate that might be present. Wipe off the silicone grease from the filter inlet where the probe was fastened and cap it. Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used between the first impinger or condenser and the filter holder, disconnect the line at the filter holder and let any condensed water or liquid drain into the impingers or condenser. After wiping off the silicone grease, cap off the filter holder outlet and impinger inlet. Either ground-glass stoppers, plastic caps, or serum caps may be used to close these openings.

Transfer the probe and filter-impinger assembly to the cleanup area. This area shall be clean and protected from the wind so that the chances of contaminating or losing the sample are minimized.

Save a portion of the solvent used for cleanup as a blank. Take 200 ml of this solvent directly from the wash bottle being used and place it in a glass sample container labeled "solvent blank."

Inspect the train prior to and during disassembly and note any abnormal conditions. Treat the samples as follows:

Containers Nos. 1, 1A. Carefully remove the filters from the filter holders and place in their identified containers. Use a pair of tweezers or clean disposable surgical gloves, or both, to handle the filters. Carefully transfer to the container any particulate matter or filter fibers, or both, that adhere to the filter holder gasket by using a dry nylon bristle brush or sharp-edged blade, or both. Seal the container.

Container No. 2. Taking care to see that dust on the outside of the probe or other exterior surfaces does not get into the sample, the testor shall quantitatively recover particulate matter or any condensate from the nozzle, probe fitting, probe liner, and from both filter holders by washing these components with solvent and placing the wash in a glass container.

Perform the solvent rinses as follows:

Carefully remove the probe nozzle and clean the inside surface by rinsing with solvent from a wash bottle and brushing with a nylon bristle brush. Brush until the solvent rinse shows no visible particles and then make a final rinse of the inside surface with solvent.

Brush and rinse the inside parts of the Swagelok fitting with solvent in a similar way until no visible particles remain.

Rinse the probe liner with solvent by tilting and rotating the probe while squirting solvent into its upper end so that all inside surfaces are wetted with acetone. Let the solvent drain from the lower end into the sample container. A glass or polyethylene funnel may be used to aid in transferring liquid washes to the container. Follow the solvent rinse with a probe brush. Hold the probe in an inclined position and squirt solvent into the upper end as the probe brush is being pushed with a twisting action through the probe; hold a sample container underneath the lower end of the probe and catch any solvent and particulate matter that is brushed from the probe. Run the brush through the probe 3 or more times until no visible particulate matter is carried out with the solvent or until none remains in the probe liner on visual inspection. With stainless steel or other metal probes, run the brush through, in the above prescribed manner, not less than 6 times, since metal probes have small crevices in which particulate matter can be entrapped. Rinse the brush with solvent and quantitatively collect these washings in the sample container. After the brushing, make a final solvent rinse of the probe as described above.

It is recommended that 2 people be used to clean the probe to minimize sample losses. Between sampling runs, keep brushes clean and protected from contamination.

After ensuring that all joints have been wiped clean of silicone grease, clean the inside of both filter holders by rubbing the surfaces with a nylon bristle brush and rinsing with solvent. Rinse each surface 3 times, or more if needed, to remove visible particulate. Make a final rinse of the brush and filter holder.

After all solvent washings and particulate matter have been collected in the sample container, tighten the lid on the sample container so that solvent will not leak out when it is shopped to the laboratory. Mark the height of the fluid level to determine whether or not leakage occurred during transport. Label the container to clearly identify its contents.

Container No. 3. Note the color of the indicating silica gel to determine if it has been completely spent and make a notation of its condition. Transfer the silica gel from the third impinger to its original container and seal. A funnel may make it easier to pour the silica gel without spilling it. A rubber policeman may be used as an aid in removing the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use any water or other liquids to transfer the silica gel. If a balance is available in the field, follow the procedure for container No. 3 in subparagraph (C) of this paragraph.

Impinger water. Treat the impingers as follows: Make a notation of any color or film in the liquid catch. Measure the liquid that is in the first 2 impingers to within ±1 ml by using a graduated cylinder or by weighing it to within ±1.0 g by using a balance if none is available. Record the volume or weight of liquid present. This information is required to calculate the moisture content of the effluent gas.

Discard the liquid after measuring and recording the volume or weight, unless analysis of the impinger catch is required (see paragraph (ii)(A)(7) of this method).

If a different type of condenser is used, measure the amount of moisture condensed either volumetrically or gravimetrically.

Whenever possible, containers shall be shipped in a manner that keeps them upright at all times.

(C) Analysis. Record the data required on a sheet such as the one shown in figure 106. Handle each sample container as follows:

Container Nos. 1, 1A. Analyze and report each filter separately. Transfer the filter and any loose particulate from the sample container to a tared-glass weighing dish. Dry the filter in an oven at 105 degrees Centigrade (220 degrees Fahrenheit) for a minimum of 2 hours, cool for at least 1 hour in a desiccator containing anhydrous calcium sulfate, and weigh and record its weight to the nearest 0.1 mg. During the weighing, the filter shall not be exposed to the laboratory atmosphere for a period of more than 2 minutes or a relative humidity above 50%. Procedures, other than those specified, that account for relative humidity effects may be used, subject to the approval of the commission. The method used for the drying and weighing of filters shall be consistent before and after the test.

Container No. 2. Note the level of liquid in the container and confirm on the analysis sheet whether or not leakage occurred during transport. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the commission, to correct the final results.

Measure the liquid in this container either volumetrically to ±1 ml or gravimetrically to ±1.0 g. Transfer the contents to a tared 250-ml beaker and evaporate to dryness either at ambient temperature and pressure for acetone or at 95 degrees Centigrade (203 degrees Fahrenheit) in an oven for distilled water. Then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) in an oven for 2 to 3 hours. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

Container No. 3. Weigh the spent silica gel, or silica gel plus impinger, to the nearest 0.5 g using a balance. This step may be conducted in the field.

"Solvent blank" container. Measure solvent in this container either volumetrically or gravimetrically. Transfer the contents to a tared 250-ml beaker and evaporate to dryness either at ambient temperature and pressure for acetone or at 95 degrees Centigrade (203 degrees Fahrenheit) in an oven for distilled water. Then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) in an oven for 2 to 3 hours. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

If acetone is used, the contents of container No. 2, as well as the acetone blank container, may be evaporated at temperatures higher than ambient. If evaporation is done at an elevated temperature, the temperature shall be closely supervised, and the contents of the beaker shall be swirled occasionally to maintain an even temperature. Use extreme care, as acetone is highly flammable and has a low flash point.

(v) Calibration.

Maintain a laboratory log of all calibrations.

(A) Probe nozzle. Probe nozzles shall be calibrated before their initial use in the field. Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in.). Make 3 separate measurements using different diameters each time and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in.). When nozzles become nicked, dented, or corroded, they shall be reshaped, sharpened, and recalibrated before use. Each nozzle shall be permanently and uniquely identified.

(B) Pitot tube. The type S pitot tube assembly shall be calibrated according to the procedure outlined in section 4 of method 2.

(C) Metering system. Before its initial use in the field, the metering system shall be calibrated according to the procedure outlined in APTD-0576. Instead of physically adjusting the dry-gas meter dial readings to correspond to the wet-test meter readings, calibration factors may be used to mathematically correct the gas meter dial readings to the proper values. Before calibrating the metering system, it is suggested that a leak check be conducted. For metering systems having diaphram or rotary pumps, the normal leak check procedure will not detect leakages within the pump. For these cases, the following leak check procedure is suggested: Make a 10-minute calibration run at 0.00057 m^3/min (0.02 cfm); at the end of the run, take the difference of the measured wet-test meter and dry-gas meter volumes; divide the difference by 10 to get the leak rate. The leak rate shall not exceed 0.00057 m^3/min (0.02 cfm).

After each field use, the calibration of the metering system shall be checked by performing 3 calibration runs at a single, intermediate orifice setting, based on the previous field test, with the vacuum set at the maximum value reached during the test series. To adjust the vacuum, insert a valve between the wet-test meter and the inlet of the metering system. Calculate the average value of the calibration factor. If the calibration has changed by more than 5%, recalibrate the meter over the full range of orifice settings, as outlined in APTD-0576.

Alternatively, a spirometer may be substituted for a wet-test meter in the above mentioned calibration procedures.

Alternative procedures, such as using the orifice meter coefficients, may be used, subject to the approval of the commission.

If the dry-gas meter coefficient values obtained before and after a test series differ by more than 5%, the test series shall be performed using whichever meter coefficient value (before or after) gives the lower value of total sample volume.

(D) Probe heater calibration. The probe heating system shall be calibrated before its initial use in the field according to the procedures outlined in APTD-0576. Probes constructed according to APTD-0581 need not be calibrated if the calibration curves in APTD-0576 are used.

(E) Temperature gauges. Use the procedure in section 4.3 of method 2 to calibrate instack temperature gauges. Dial thermometers, such as those used for the dry-gas meter and condenser outlet, shall be calibrated against mercury-in-glass thermometers.

(F) Leak check of metering system shown in figure 103. That portion of the sampling train from the pump to the orifice meter shall be leak-checked prior to initial use and after each shipment. Leakage after the pump will result in less volume being recorded than is actually sampled. The following procedure is suggested (see figure 107): Close the main valve on the meter box. Insert a 1-hole rubber stopper with rubber tubing attached into the orifice exhaust pipe. Disconnect and vent the low side of the orifice manometer. Close off the low side orifice tap. Pressurize the system to 13 to 18 cm (5 to 7 in.) water column by blowing into the rubber tubing. Pinch off the tubing and observe the manometer for 1 minute. A loss of pressure on the manometer indicates a leak in the meter box; leaks, if present, shall be corrected.

(G) Barometer. Calibrate against a mercury barometer.

(vi) Calculations.

When carrying out calculations, retain at least 1 extra decimal figure beyond that of the acquired data. Round off figures after the final calculation. Other forms of the equations may be used if they give equivalent results.

(A) Nomenclature.

An = Cross-sectional are of nozzle, $m^2(ft^2)$.
A = Cross-sectional area of stack or flue at the point of sampling, ft^2.
Bws = Water vapor in the gas stream, proportion by volume, expressed as a fraction.
Bwi = Percent water vapor in gas entering source particulate control device, determined by method 4.
Bwo = Percent water vapor in gas exiting source particulate control device.
Ca = Wash blank residue concentration, mg/g.
Cs = Concentration of particulate matter in stack gas, pounds per 1000 pounds of actual stack gas.
CsD = Concentration of particulate matter in stack gas, moisture excluded, pounds per 1000 pounds of dry stack gas.
Cs50 = Concentration of particulate matter corrected to 50% excess air, pounds per 1000 pounds of stack gas.
Cs500 = Concentration of particulate matter corrected to 50% excess air, excluding any water addition from a collector, pounds per 1000 pounds of stack gas.
E = Mass emission rate of particulate, lb/hr.

F50 = Concentration conversion factor to 50% excess air with no moisture alterations in exhaust.
F50D = Concentration conversion factor to 50% excess air, excluding any moisture added to exhaust gas by pollution collection system.
FD = Concentration conversion factor to dry basis, excluding any water in the stack gas.
I = Percent of isokinetic sampling.
La = Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate, whichever is less.
Li = Individual leakage rate observed during the leak check conducted prior to the "ith" component change (i 1, 2, 3 . . . . n), m^3/min (cfm).
Lp = Leakage rate observed during the post-test leak check, m^3/min (cfm).
Md = Molecular weight of dry stack gas, g/g mole (lb/lb-mole), calculated by method 3, equation 3-2, using data from integrated method 3.
mn = Total amount of particulate matter collected, mg.
Mw = Molecular weight of water, 18.0 g/g-mole (18.0 lb/lb-mole).
ma = Mass of residue of solvent after evaporation, mg.
mg = Total weight of gas samples through nozzle, lb.
Pbar = Barometric pressure at the sampling site, mm Hg (in. Hg).
Ps = Absolute stack gas pressure.
Pstd = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).
R = Ideal gas constant, 0.06236 mm Hg-m^3/°K-g-mole (21.85 in. Hg-ft^3/°R-lb-mole).
Tm = Absolute average dry-gas meter temperature (see figure 104), °K (°R).
Ts = Absolute average stack gas temperature (see figure 104), °K(°R).
Tstd = Standard absolute temperature, 294.1°K (530°R).
Va = Volume of solvent blank, ml.
Vaw = Volume of solvent used in wash, ml.
Vlc = Total volume of liquid collected in impingers and silica gel (see figure 106), ml.
Vm = Volume of gas sample as measured by dry-gas meter, dcm (dcf).
Vm(std) = Volume of gas sample measured by the dry-gas meter, corrected to standard conditions, dscm (dscf).
Vw(std) = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf).
Vs = Stack gas velocity, calculated by method 2, equation 2-9, using data obtained from method 5, m/sec (ft/sec).
Wa = Weight of residue in solvent wash, mg.
Y = Dry-gas meter calibration factor.
ΔH = Average pressure differential across the orifice meter (see figure 104), mm H_2O (in H_2O).
$\%O_2$ = Percent oxygen in stack gas by volume (dry basis).
$\%N_2$ = Percent nitrogen in stack gas by volume (dry basis).
pa = Density of solvent, mg/ml.
ps(std) = Density of all sampled gas at standard conditions, lb/ft^3.
pw = Density of water, 0.9982 g/ml (0.002201 lb/ml).
Θ = Total sample time, min.
Θ_1 = Sample time, interval, from the beginning of a run until the first component change, min.

θ_i = Sampling time interval, between 2 successive component changes, beginning with the interval between the first and second changes, min.
θ_p = Sampling time interval, from the final (n^{th}) component change until the end of the sampling run, min.
13.6 = Specific gravity of mercury.
60 = Sec/min.
100 = Conversion to percent.
386.9 = Cubic feet per lb-mole of ideal gas at standard conditions.
453.9 = Conversion of pounds to grams.
3600. = Conversion of hours to sec.
1000 = Conversion of 1000 lb units to lb units.

(B) Average the dry-gas meter temperature and average the orifice pressure drop. See data sheet (figure 5-2).

(C) Dry gas volume. Correct the sample volume measured by the dry-gas meter to standard conditions (21.1 degrees Centigrade, 760 mm Hg or 70 degrees Fahrenheit, 29.92 in. Hg) by using equation 5-1.

$$vm(std) = \frac{Vm\ Y\ Tstd\ (Pbar\ \&\ \Delta H/13.6)}{Tm\ Pstd} = K1\ Vm\ Y\ \frac{Pbar\ \&\ (\Delta H/13.6)}{Tm} \qquad \text{equation 5-1}$$

where:
K1 = 0.3869 °K/mm Hg for metric units.
= 17.71 °R/in. Hg for English units.

Equation 5-1 can be used as written. However, if the leakage rate observed during any of the mandatory leak checks (i.e., the post-test leak check or leak checks conducted prior to component changes) exceeds La, equation 5-1 shall be modified as follows:

(1) Case I. No component changes made during sampling run. In this case, replace Vm in equation 5-1 with the expression:

$$Vm - (Lp - La)\theta$$

(2) Case II. One or more component changes made during the sampling run. In this case, replace Vm in equation 5-1 by the expression:

$$Vm - (L_1 - La)\ \theta_1 - \sum_{i=2}^{n} (L_i - L_a)\ \theta_i - (L_p - L_a)\ \theta p$$

and substitute only for those leakage rates (L_i or L_p) that exceed L_a.

(D) Volume of water vapor.

$$Vw(std) = Vlc\ (pw/Mw)(RTstd/Pstd) = K_2\ V_{1c} \qquad \text{equation 5-2}$$

where:
K_2 = 0.001338 m^3/ml for metric units.
= 0.04733 ft^3/ml for English units.

(E) Moisture content.

$$Bws = Vw(std)/(Vm(std) + Vw(std)) \qquad \text{equation 5-3}$$

In saturated or water droplet-laden gas streams, 2 calculations of the moisture content of the stack gas shall be made: 1 from the impinger analysis (equation 5-3), and a second from the assumption of saturated conditions. The lower of the 2 values of Bws shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in the note of section 1.2 of method 4. For the purpose of this method, the average stack gas temperature from figure 104 may be used to make the determination, if the accuracy of the instack temperature sensor is ±1 degree Centigrade (2 degrees Fahrenheit).

(F) Solvent blank concentration.

$Ca = ma/(Va\ pa)$ equation 5-4

(G) Solvent wash blank.

$Wa = Ca\ Vaw\ pa$ equation 5-5

(H) Total particulate weight. Determine the total particulate catch from the sum of the weights obtained from containers 1, 1A, and 2 less the wash solvent blank (see figure 106).

Refer to paragraph (iv)(A)(5) of this method to assist in the calculation of results involving 2 or more pairs of filters or 2 or more sampling trains.

(I) Sampled gas density. Determine the density of the gas sampled from the stack, at standard conditions (lb/ft^3).

$ps(std) = (Md\ (1-Bws) + Mw\ Bws)/386.9$ equation 5-6

(J) Total weight of gas sampled (lbs).

$mg = (Vm(std) + Vw(std))\ ps(std)$ equation 5-7

(K) Particulate concentration (lbs/1000 lbs).

$Cs = mn/(453.6\ mg)$ equation 5-8

(L) Excess air and moisture correction factors.

(1) Correction factor to 50% excess air for those sources with or without any particulate collector where no increase in moisture content of the exhaust gas occurs after the process and before the point of sampling.

$$F50 = \frac{Md + 18\ Bwo/(100-Bwo)}{0.1826\ \%N2 - 2.0592\ \%O2 + Md + 18Bwo/(100-Bwo)}$$ equation 5-9

(2) Correction factor to 50% excess air for those sources with a wet collection device (scrubber) that increases the moisture content of the exhaust gas after the process and before the point of sampling.

$$F50D = \frac{Md + 18\ Bwo/(100-Bwo)}{0.1826\ \%N2 - 2.0592\ \%O2 + Md + 18\ Bwi/(100-Bwi)}$$ equation 5-10

(3) Correction factor to convert the actual concentration, Cs, to dry conditions.

$$F = \frac{Md + 18\ Bwo/(100-Bwo)}{Md}$$

(M) Converted particulate concentrations, where applicable under the commission's rules or permit.

$Cs50 = Cs\ F50$ equation 5-12

$Cs50D = Cs\ F50D$ equation 5-13

$CsD = CsFD$ equation 5-14

(N) Mass emission rate (lb/hr.).

$$E = \frac{3600\ A\ Vs\ Cs\ Ps\ Tstd\ ps(std)}{1000\ Ts\ Pstd}$$

$$= K3\ A\ Vs\ Cs\ Ps\ ps(std)/Ts$$

where:

K3 = 63.77 for English units.

(O) Isokinetic variation.

(1) Calculation from raw data.

$$I = \frac{100\ Ts\ (K4\ Vlc = (Vm/Tm)(Pbar + \Delta H/13.6))}{60\ \theta\ Vs\ Ps\ An}$$ equation 5-16

where:

K4 = 0.003458 mm Hg - m^3ml - ^oK for metric units.

= 0.002672 in. Hg - ft^3/ml - ^oR for English units.

(2) Calculation from intermediate values.

$$I = \frac{Ts\ Vm(std)\ Pstd\ 100}{Tstd\ Vs\ \theta\ An\ Ps\ 60(1 - Bws)}$$ equation 5-17

T V

$$= K5 \frac{Ts\ Vm(std)}{Ps\ Vs\ An\ \theta(1 - Bws)}$$

where:

K5 = 4.307 for metric units.
= 0.09409 for English units.

(P) Acceptable results. If $90\% \leq I \leq 110\%$, the results are acceptable. If the results are low in comparision to the standard and I is beyond the acceptable range, or if I is less than 90%, the commission may opt to accept the results. Otherwise, reject the results and repeat the test.

(vii) Bibliography.

(A) Federal Register, Volume 42, No. 160, Part 60, Chapter 1, Title 40, Appendix A, Method 5, August 18, 1977.

(B) Martin, Robert M. Construction Details of Isokinetic Source Sampling Equipment. Environmental Protection Agency. Research Triangle Park, N.C. APTD-0581. April, 1971.

(C) Rom, Jerome J. Maintenance, Calibration, and Operation of Isokinetic Source Sampling Equipment. Environmental Protection Agency. Research Triangle Park, N.C. APTD-0576. March, 1972.

(D) Shigehara, R. T. "Adjustments in the EPA Nomograph for Different Pitot Tube Coefficients and Dry Molecular Weights." Stack Sampling News 2:4 - 11, October, 1974.

(E) Guidelines for Source Testing of Particulate. Michigan Department of Natural Resources, Air Quality Division. June 1, 1977.

FIGURE 101
PARTICULATE SAMPLING TRAIN

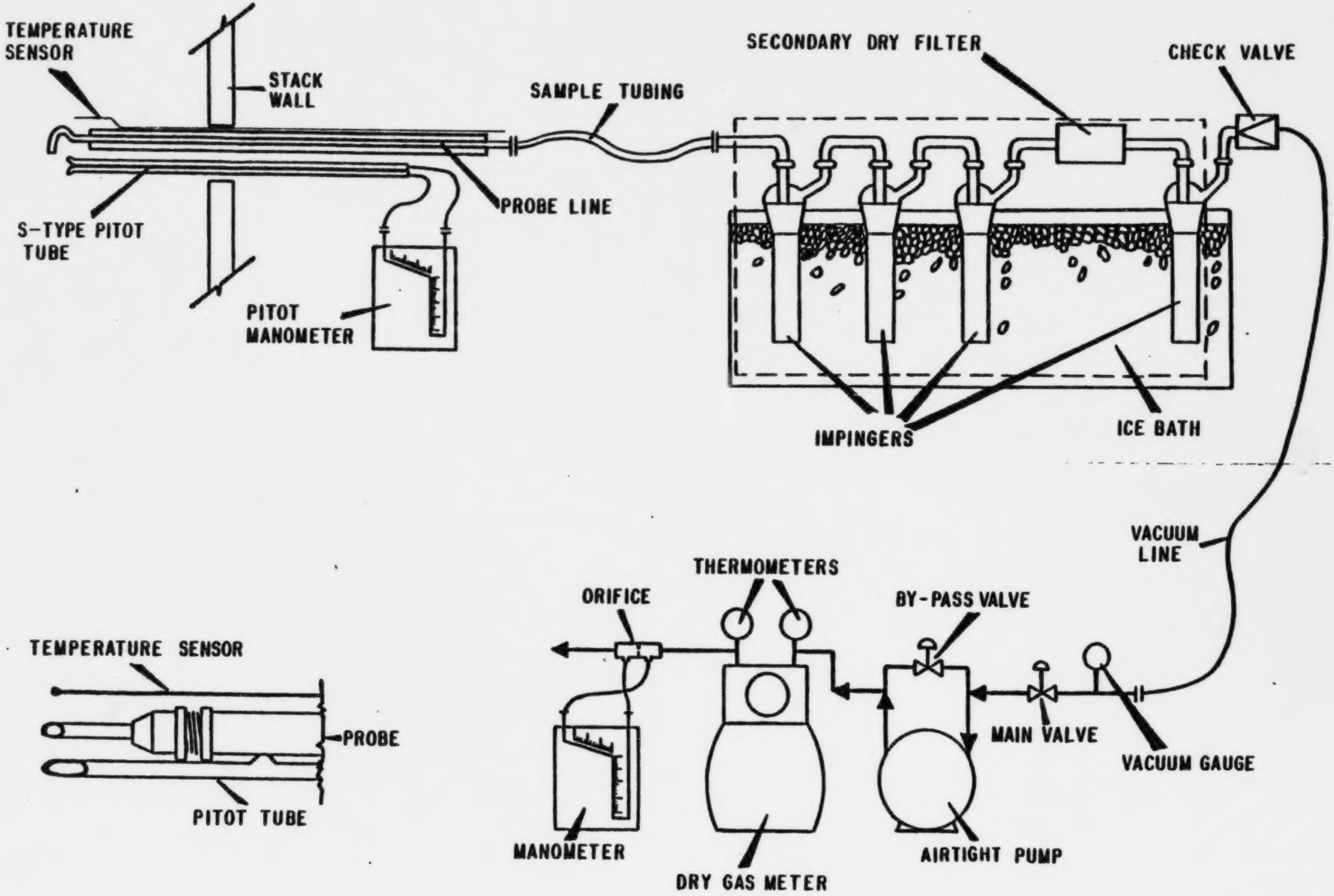
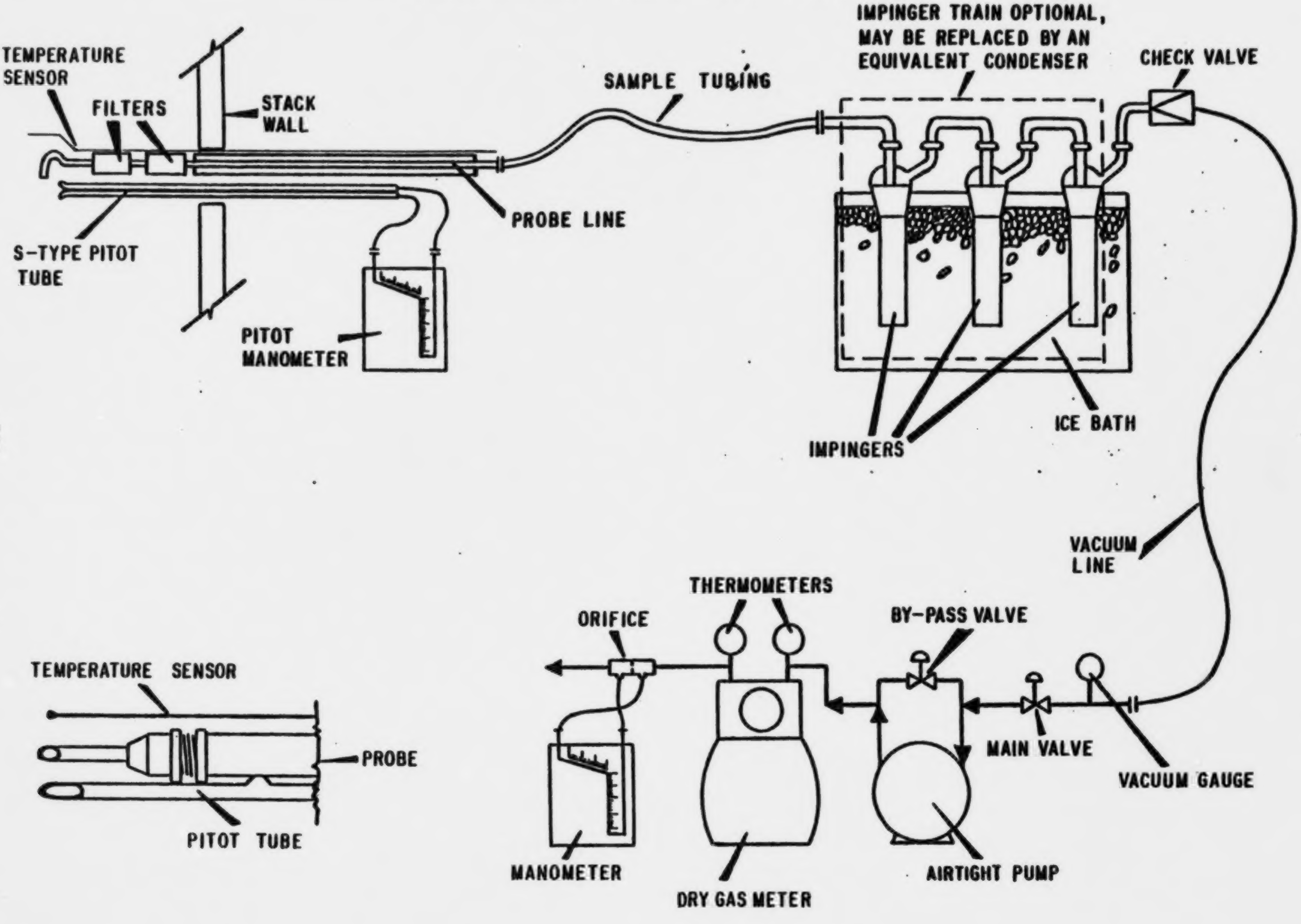

TEMPERATURE SENSOR
STACK WALL
S-TYPE PITOT TUBE
PITOT MANOMETER
PROBE LINE
SAMPLE TUBING
SECONDARY DRY FILTER
CHECK VALVE
IMPINGERS
ICE BATH
VACUUM LINE
THERMOMETERS
ORIFICE
BY-PASS VALVE
MAIN VALVE
VACUUM GAUGE
MANOMETER
DRY GAS METER
AIRTIGHT PUMP
TEMPERATURE SENSOR
PROBE
PITOT TUBE

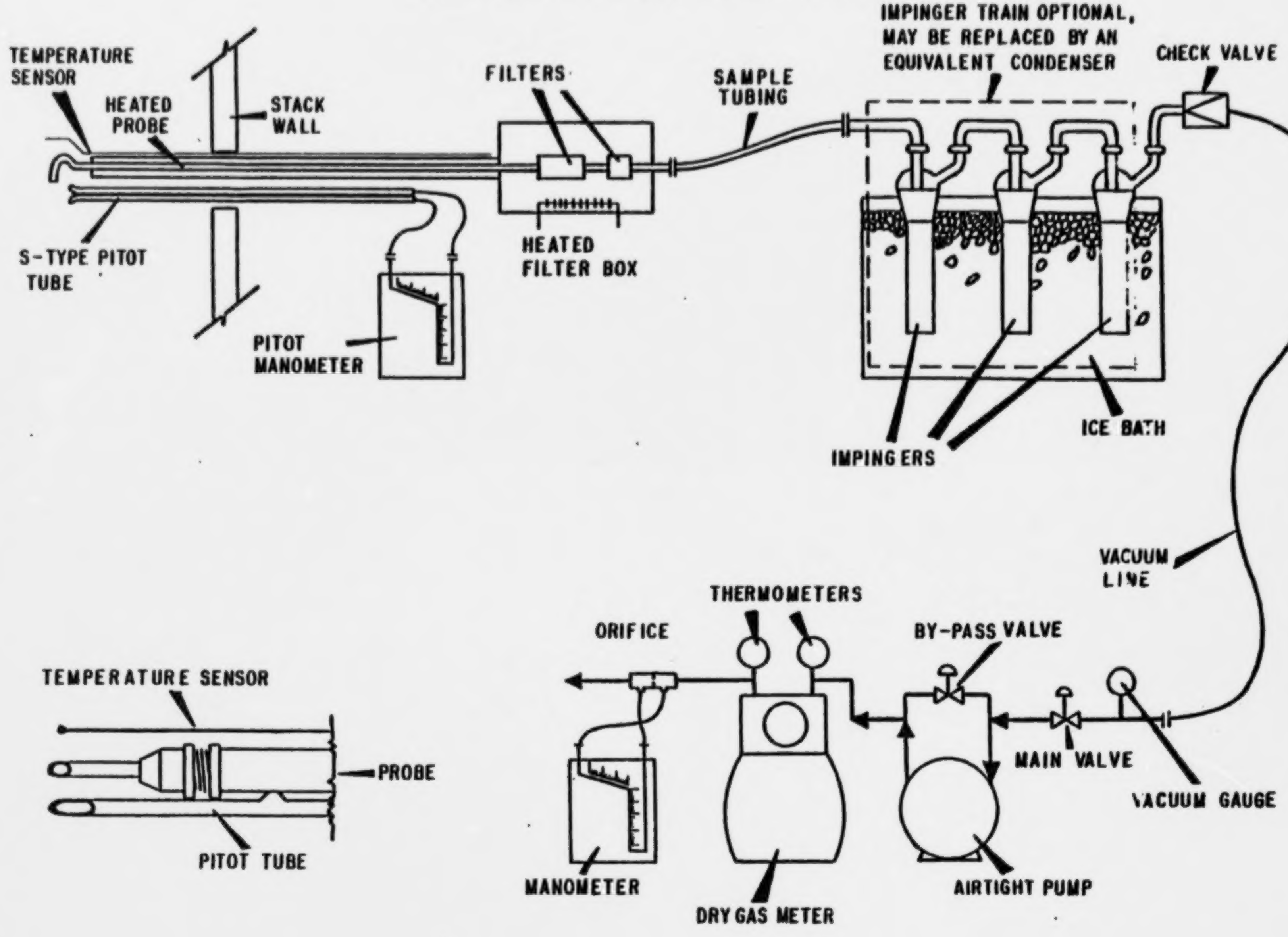
FIGURE 102
PARTICULATE SAMPLING TRAIN



TEMPERATURE SENSOR
FILTERS
STACK WALL
SAMPLE TUBING
IMPINGER TRAIN OPTIONAL, MAY BE REPLACED BY AN EQUIVALENT CONDENSER
CHECK VALVE
S-TYPE PITOT TUBE
PROBE LINE
PITOT MANOMETER
ICE BATH
IMPINGERS
VACUUM LINE
THERMOMETERS
ORIFICE
BY-PASS VALVE
TEMPERATURE SENSOR
PROBE
MAIN VALVE
VACUUM GAUGE
PITOT TUBE
MANOMETER
AIRTIGHT PUMP
DRY GAS METER

FIGURE 103

PARTICULATE SAMPLING TRAIN


IMPINGER TRAIN OPTIONAL,
MAY BE REPLACED BY AN
EQUIVALENT CONDENSER
TEMPERATURE SENSOR
HEATED PROBE
STACK WALL
FILTERS
SAMPLE TUBING
CHECK VALVE
S-TYPE PITOT TUBE
HEATED FILTER BOX
PITOT MANOMETER
ICE BATH
IMPINGERS
VACUUM LINE
THERMOMETERS
ORIFICE
BY-PASS VALVE
TEMPERATURE SENSOR
PROBE
MAIN VALVE
VACUUM GAUGE
PITOT TUBE
MANOMETER
AIRTIGHT PUMP
DRY GAS METER

PLANT ____________
LOCATION ____________
OPERATOR ____________
DATE ____________
RUN NO. ____________
SAMPLE BOX NO. ____________
METER BOX NO. ____________
METER ΔH@ ____________
C FACTOR ____________
PITOT TUBE COEFFICIENT, C_p ______

SCHEMATIC OF STACK CROSS SECTION

AMBIENT TEMPERATURE ____________
BAROMETRIC PRESSURE ____________
ASSUMED MOISTURE, % ____________
PROBE LENGTH, m(ft) ____________
NOZZLE IDENTIFICATION NO. ____________
AVERAGE CALIBRATED NOZZLE DIAMETER, cm(in.) ____
PROBE HEATER SETTING ____________
LEAK RATE, m^3/min (cfm) ____________
PROBE LINER MATERIAL ____________

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE mm Hg (in Hg)	STACK TEMPERATURE (T_S), °C(°F)	VELOCITY HEAD (ΔP_S), mm(in.) H_2O	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER mm H_2O (in. H_2O)	GAS SAMPLE VOLUME m^3(ft^3)	GAS SAMPLE TEMPERATURE AT DRY GAS METER		FILTER HOLDER TEMPERATURE °C(°F)	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °C(°F)
							INLET °C(°F)	OUTLET °C(°F)		
TOTAL							Avg.	Avg.		
AVERAGE							Avg.			

Figure 104. Particle field data.

Plant ______________________________

Date ______________________________

Run No. ______________________________

Relative Humidity ______________________________

Amount liquid lost during transport ______________________________

Solvent blank volume, ml ______________________________

Solvent wash volume, ml ______________________________

Solvent blank concentration, mg/mg (equation 5-4) __________

Impinger water blank concentration ______________________________

Solvent wash blank, mg (equation 5-5) ______________________________

CONTAINER NUMBER	WEIGHT OF PARTICULATE COLLECTED MG		
	FINAL WEIGHT	TARE WEIGHT	WEIGHT GAIN
1			
2			
IMPINGER 1			
IMPINGER 2			
IMPINGER 3			
TOTAL	☒	☒	
Less solvent and impinger blanks			
Weight of particulate matter			

	VOLUME OF LIQUID WATER COLLECTED		
	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g	
FINAL			
INITIAL			
LIQUID COLLECTED			
TOTAL VOLUME COLLECTED		g*	ml

CONVERT WEIGHT OF WATER TO VOLUME BY DIVIDING TOTAL WEIGHT INCREASE BY DENSITY OF WATER (1g/ml).

$$\frac{\text{INCREASE, g}}{1\ \text{g/ml}} = \text{VOLUME WATER, ml}$$

Figure 105. Analytical data.

Plant

Date

Run No.

Relative Humidity

Amount liquid lost during transport

Solvent blank volume, ml

Solvent wash volume, ml

Solvent blank concentration, mg/mg (equation 5-4)

Solvent wash blank, mg (equation 5-5)

CONTAINER NUMBER	WEIGHT OF PARTICULATE COLLECTED, mg		
	FINAL WEIGHT	TARE WEIGHT	WEIGHT GAIN
1			
1A			
2			
TOTAL	X	X	
Less solvent blank			
Weight of particulate matter			

	VOLUME OF LIQUID WATER COLLECTED	
	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL		
INITIAL		
LIQUID COLLECTED		
TOTAL VOLUME COLLECTED		g* ml

CONVERT WEIGHT OF WATER TO VOLUME BY DIVIDING TOTAL WEIGHT INCREASE BY DENSITY OF WATER (1g/ml).

$$\frac{\text{INCREASE, g}}{1\ \text{g/ml}} = \text{VOLUME WATER, ml}$$

Figure 106. Analytical data.

CITY OF GRAND RAPIDS

AIR POLLUTION CONTROL REGULATIONS

ORDINANCE NO. 72-34

AN ORDINANCE TO AMEND SECTIONS 9.35 AND 9.36 OF ARTICLE 4, CHAPTER 151 TITLE IX OF THE CODE OF THE CITY OF GRAND RAPIDS TO DESCRIBE CERTAIN DUTIES AS TO INSPECTIONS AND RECORD KEEPING RELATIVE TO AIR POLLUTION.

THE PEOPLE OF THE CITY OF GRAND RAPIDS DO ORDAIN:

Section 1

That Section 9.35 of Article of Chapter 151 Title IX of the Code of the City of Grand Rapids be amended to read as follows:

9.35 Violations

(1) Open Burning - No person shall cause or permit an open fire or authorize any such open fire to be kindled or maintained except in accordance with Section 29 of the Code of the City of Grand Rapids.

(2) Emission of Particulate Matter - No person shall cause or allow the emission of particulate matter from any source in excess of the emission schedule of The Rules.

(3) No person shall violate any of the requirements of this Article 4 or any of the lawful orders of the Director made in pursuance thereof.

Section 2

That Section 9.36 of Article 4 of Charter 151 of Title IX of the Code of the City of Grand Rapids be amended to read as follows:

9.36 Duties and Powers of the Director

(1) The Director shall enforce all provisions of the Article 4 of Chapter 151 of Title IX of the Code of the City of Grand Rapids and shall act on any question relative to compliance or enforcement of any of the requirements provided in this Article 4 relating to any air contaminant, air pollution, chimney, combustion equipment, flyash, industrial dust, open burning, particulate matter, process equipment, refuse burning salvage operation or smoke incinerator.

(2) The Director shall have the authority to enter at any reasonable hour upon any premises, occupancy, building or structure which contains any of the uses or conditions specified as in paragraph (1) hereof and shall inspect the same as to compliance with the requirements of this Article 4 and shall issue all necessary notices or orders to remove non-compliance, illegal or unsafe conditions or operations.

(3) The Director shall make all required inspections or may accept reports of inspection by authoritative and recognized services or individuals and all reports of such inspections shall be in writing and certified by a responsible officer or he may engage such expert opinicn as he may deem necessary to report of an unusual technical issue that may arise.

(4) He shall keep official records of applications received, permits and certificates issued, fees collected, repairs of inspections, notices and orders issued. File copies of all paper in connection with inspection reports shall be retained in his official records so long as the buildings, structure or operation shall remain in existence.

MICHIGAN

VOLUME 1B

APPENDIX

MICHIGAN AIR POLLUTION IMPLEMENTATION PLAN

JANUARY 1972

WAYNE COUNTY

AIR POLLUTION CONTROL REGULATIONS

ARTICLE I

GENERAL PROVISIONS

Section 1.1

Short Title - This regulation shall be known and cited as the Wayne County Air Pollution Control Regulation

Section 1.2

This regulation is designed to control air pollution by providing for the establishment of the office and prescribing the duties of the director of air pollution control, and empowering investigation and abatement by the director of violations of this regulation; for the establishment and enforcement of rules and regulations; for an air pollution appeals board; for permits for the installation, construction, addition to, alteration, and use of process, fuel-burning, refuse-burning, and control equipment and for fees for the same; for inspections and tests for process, fuel-burning, refuse-burning, and control equipment and for the issuance of certificates of operation and for fees therefor, establishing limitations upon the emission of air contaminants, declaring emissions which do not meet such limitations to be unlawful, prohibiting certain acts causing air pollution, providing for fines and penalties for violation of the provisions of this regulation; and for just and adequate means by which the provisions of this regulation may be executed.

Section 1.3

Definition of Terms - The following words and phrases when used in this regulation shall for the purpose of this regulation have the meanings respectively ascribed to them in this article, unless a different meaning is clearly indicated.

Air Contaminant - Any gaseous, liquid, or solid matter, which when present in the outdoor atmosphere contributes to a condition of air pollution, including, but not limited to, dust, soot, mist, smoke, fumes, fly ash, cinders, gases, vapors, aerosols, and odors.

Air Pollution - The presence in the outdoor atmosphere of one or more air contaminants or combinations thereof in such quantities and of such duration and characteristics which are or may tend to be injurious to human, plant, or animal life, or property, or which interfere with the comfortable enjoyment of life or property or the conduct of business.

Board - The Wayne County Board of Health.

Certificate of Operation - A certificate issued by the director authorizing the use of any process, fuel-burning, refuse-burning, or control equipment for the period indicated after it has been found that it can be operated in compliance with this regulation.

Control Equipment - Any equipment which has the function of controlling a process, fuel-burning, or refuse-burning equipment and thus reduce the creation of, or the emission of air contaminants to the atmosphere, or both.

County - County of Wayne, Michigan.

Department - The Wayne County Department of Health.

Director - The Director of the Wayne County Department of Health or his duly authorized representatives.

Fuel-burning Equipment - Equipment, device, or contrivance and all appurtenances thereto, including ducts, breechings, control equipment, fuel-feeding equipment, ash-removal equipment, combustion controls, stacks, chimneys, etc., used principally but not exclusively, to burn any fuel for the purpose of indirect heating in which the material being heated is not contacted by and adds no substance to the products of combustion. Such equipment typically includes that used for heating water to boiling; radiant steam, or super-heating steam; heating air as in a warm air furnace; furnishing process heat that is conducted through process vessel walls; and furnishing process heat indirectly through its transfer by fluids.

Installation Permit - A permit issued by the director authorizing the construction, installation or alteration of any process, fuel-burning, refuse-burning, or control equipment in accordance with plans and specifications approved by the director.

Open burning - Any combustion process from which the products of combustion are emitted directly into the outdoor atmosphere without passing through a stack.

Particulate Matter - Material other than uncombined water which is or has been suspended in air or other gases and is a liquid or solid at standard conditions of temperature and pressure.

Person - Any individual natural person, trustee, court appointed representative, syndicate, association, partnership, firm, club, company, corporation, business trust, institution, agency, government corporation, municipal corporation, city, county, municipality, district or other political subdivision, department, bureau, agency or instru-

mentality of Federal, state, or local government, or other entity recognized by law as the subject of rights and duties. The masculine, feminine, singlular, or plural is included in any circumstances.

Process Equipment - Any equipment, device or contrivance for changing any materials whatever or for storage or handling of any materials, and all appurtenances thereto, including ducts, stacks, etc., the use of which may cause any discharge of an air contaminant into the outdoor atmosphere but not including that equipment specifically defined as fuel-burning equipment or refuse-burning equipment in this regulation.

Refuse-burning Equipment - Any equipment, device, or contrivance used for the destruction of garbage, rubbish, and/or other wastes by burning, and all appurtenances thereto.

Salvage Operations - Any operation conducted in whole or in part for the salvaging or reclaiming of any product or material.

Seal for Sealing Equipment or Premises - A device installed by the director so as to prevent use of the process, fuel-burning, refuse-burning, or control equipment or premises causing the violation or from which violations of this regulation originate.

Smoke - Small gas and air-borne particles consisting essentially of carbonaceous material in sufficient number to be observable.

Standard Conditions - A gas temperature of 60 degrees Fahrenheit and a gas pressure of 14.7 pounds per square inch absolute.

Stack - Stack, chimney, flue, conduit, or opening arranged for the emission of solids, liquids, gases or aerosols into the outdoor atmosphere.

Division - Wayne County Department of Health, Air Pollution Control Division.

Hydrogen Sulfide - (H_2S): A colorless gas at standard conditions which has the molecular formula H_2S.

Opacity - A state which renders material partially or wholly impervious to rays of light and causes obstruction of an observer's view.

Process Weight - "Process Weight" means the total weight of all materials introduced into a source operation, including solid fuels, but excluding liquids and gases used solely as fuels, and excluding air introduced for purposes of combustion.

Process Weight Rate - "Process Weight Rate" means a rate established as follows:

(a) For continuous or long-run steady-state source operations, the total process weight for the entire period of continuous operation or for a typical portion thereof, divided by the number of hours of such period or portion thereof.

(b) For cyclical or batch source operations, the total process weight for a period that covers a complete operation or an integral number of cycles, divided by the hours of actual process operation during such a period.

(c) When the nature of any process or operation or the design of any equipment is such as to permit more than one (1) interpretation of this definition the interpretation that results in the minimum value for allowable emission applies.

Public Health Director - Director or acting director of the department.

Ringelmann Chart - The chart published and described in the bureau of mines, U. S. Department of Interior, information circular 8333, which illustrates graduated shades of gray to black by which the density of smoke may be scaled, or any chart, recorder, indicator or device for the measurement of gray to black smoke density which is approved by the board as the equivalent of the Ringelmann scale.

Source Operation - "Source Operation" means the last operation preceding the emission of an air contaminant, which operation (a) results in the separation of the air contaminant from the process material or in the conversion of the process materials into air contaminants, as in the case of combustion fuel; and (b) is not an air pollution abatement operation.

Sulfur Dioxide (SO_2): A colorless gas at standard conditions which has the molecular formula SO_2.

Sulfur Trioxide (SO_3): A compound which has the molecular formula SO_3.

Sulfuric Acid ($H_2 SO_4$): A compound which has the molecular formula H_2SO_4.

ARTICLE II

ADMINISTRATIVE ORGANIZATION

Section 2.1

Enforcement Agency - The Wayne County Department of Health is charged with the duty of investigating, preventing, and abating causes of air pollution and enforcing the provisions of this regulation. The responsibility for the enforcement of this regulation shall rest with the Director of the Wayne County Department of Health and through his duly authorized agents.

Section 2.2

Powers and Duties of the Director - The director shall have the power and the duty to:

(a) Supervise the implementation of this regulation.

(b) Institute complaints against all persons violating any provision of this regulation and institute necessary legal proceedings to prosecute violations of this regulation and compel the prevention and abatement of air pollution or nuisances arising therefrom.

(c) Examine and approve or disapprove the plans for fuel and refuse-burning equipment, process equipment, and control equipment to be installed, constructed, reconstructed, added to, or altered, to assure that they are in accordance with the requirements of this regulation.

(d) Make inspections and tests of existing and newly installed, constructed, reconstructed, or altered fuel or refuse-burning equipment, process equipment, and control equipment to determine if there is compliance with the provisions of this regulation.

(e) Investigate complaints of violations of this regulation and make inspections and observations of air pollution conditions. Record such investigations, complaints, inspections, and observations.

(f) Approve or reject applications for permits and administer the issuance of certificates of operation, notices or other matters required under the provisions of this regulation.

(g) Prepare and place before the Board of Health for its consideration proposals for additions or revisions to this regulation, or any other regulation pertaining to air pollution abatement.

(h) Encourage voluntary cooperation by persons or affected groups in air pollution control.

(i) Collect and disseminate information on air pollution control.

(j) Work with planning and zoning agencies for the purpose of coordinating activities under provisions of this regulation and foster the best possible management of the air resources of the County.

(k) Cooperate and work with Federal, interstate, state, county, district, municipal, and other agencies concerned with air pollution with regard to aerometric studies, abatement programs, public complaints and other matter to the end that the air resources of Wayne County shall be best conserved and improved.

(l) Subject to the laws of the State of Michigan and Wayne County, and with the approval of the Wayne County Board of Supervisors, accept, receive, and give receipts for monies, for and in behalf of the County, given by the Federal or State governments under any Federal or state law to the County for air pollution control activities, surveys, investigations, research, or programs.

(m) Conduct investigations, studies, and other required work which will lead ultimately to the development of gaseous emission standards on such pollution generating activities as motor vehicles, heat and power generation, incineration, chemical processes, and any other gaseous pollution sources.

(n) Do any and all acts which may be necessary for the successful prosecution of the purposes of this regulation and such other acts as may be specifically enumerated herein as his duties.

Section 2.2A

Emergency Powers Of The Public Health Director - Notwithstanding any other provisions of this regulation, the public health director, upon receipt of evidence that a pollution source or combination of sources (including moving sources) is presenting an imminent and substantial endangerment to the health of persons, may order complete shutdown, curtailment, or modification of any operation or activity causing or contributing to the alleged pollution and may bring suit on behalf of the department in the Wayne County circuit court to immediately restrain any person who fails to follow his orders.

Section 2.3

Appeals Board -

(a) Power and Duties - An Appeals Board shall be selected by the Board of Health. The Appeals Board shall hear and decide appeals taken from any decision, ruling, or order of the director in accordance with the procedures prescribed in Article IX Variances and in Article X Appeals.

(b) Organization - The Appeals Board shall consist of nine (9) members. One (1) member shall be a representative from the medical profession actively engaged in the practice of medicine, preferable with a background in public health. Two (2) members shall be representatives from the engineering profession and shall be experienced in the control of air pollution. One (1) of the engineering members shall be a representative from industries or businesses directly affected and subject to the provisions of this regulation. One (1) member shall be a representative from the legal profession actively engaged in the private practice of law. Two (2) members shall be representatives of business or industry, one (1) of which shall be from the industries or businesses directly affected and subject to the provisions of this reguation. Two (2) members shall be citizens representative of the interests and point of view of the general public, one of whom shall be a woman prominent in community affairs. One (1) member shall be a representative from organized labor. The final composition of the Board shall include no more than two (2) members from the industries or businesses directly affected and subject to the provisions of this regulation, and no more than two (2) members from governmental agencies.

In order that the terms of office of all members of the Board shall not expire at the same time, the intitial appointments to the Board shall be as follows:

Three (3) members shall be appointed for a term of one (1) year. Two (2) members shall be appointed for a term of two (2) years, two (2) members shall be appointed for a term of three (3) years, and two (2) members shall be appointed for a term of four (4) years. Thereafter, all appointments shall be made for a term of four (4) years. Appointments to fill any vacancy on the Appeals Board shall be for the remainder of the unexpired term of office.

The Board of Health shall have the power to remove any member of the Appeals Board from office with cause upon a 3/5 vote of the Board of Health. Any member who fails to attend three (3) successive scheduled meetings without cause shall immediately forfeit his office and the Board of Health shall promptly fill such vacancy.

The members of the Appeals Board shall elect a chairman and such other officers as they deem necessary or desirable, all of whom shall have voting privilieges. Six (6) members of the Appeals Board shall constitute a quorum necessary to hold meetings and take any action.

Any final order or determination or other final action by the Appeals Board shall be approved by not less than five (5) members of the Appeals Board who shall have been present at the meeting at which such order was adopted.

Members shall serve without compensation, but shall be reimbursed for necessary expenses incurred in the performance of their official duties, upon the approval of the Board of Health within budget limitations. The Chairman may call meetings of the Appeals Board when there is business before the Board and meetings may be called by written notice signed by five (5) members of the Appeals Board. Written minutes shall be kept of all meetings of the Appeals Board, and shall be public. All meetings shall be public.

ARTICLE III
STANDARDS AND RECOMMENDED PRACTICES

Section 3.1

Adopted Standards or Recommended Practices - Where reference is made in this regulation to the standards or recommended practices of national technical societies, associations, or other organizations, such information shall form and be considered an integral part of the regulation in the same manner and extent as if fully reproduced herein, provided such standards are fully identified. Not less than two copies of such standards or recommended practices of technical societies, associations, or other organizations shall be kept on file at all times in the office of the director and shall be available for consultation by the public.

ARTICLE IV
INSTALLATION PERMIT AND CERTIFICATE OF OPERATION

Section 4.1

Application Required - Except as herein provided, no person shall construct, install, reconstruct, or alter any process, fuel-burning, refuse-burning, or control equipment pertaining thereto, which may be a source of air contaminant, for use within the County until an application, including not less than two sets of plans of specifications, or both, of the process, fuel-burning, refuse-burning, or control equipment and structures or buildings used in connection therewith, has been filed by the person or his agent in the office of, and has been approved by, the director and until an installation permit has been issued by the director for such construction, installation, or alteration. Upon written request and submission of adequate supplementary data, the director may amend the original installation permit application.

Section 4.2

Information Required - The director may require the submission of such information, evidence, or documentation to satisfy him that the equipment for which an installation permit application has been applied, can be operated within the emission standards and prohibitions of Article VI. Any information relating to secret processes, methods of manufacture, products, or production ascertained or discovered by the Director or the Appeals Board during the conduct of their work shall not be disclosed in whole or in part and shall be held confidential.

Section 4.3

Work Begun - Where work is begun in violation of installation permit requirements, the director may grant such permit, conditional upon removal of all work which is not in accordance with this regulation or any rules and regulations promulgated under this regulation.

Section 4.4

Action on Permits - An application shall be approved or rejected within thirty (30) days after it is filed in the office of the director. The director shall notify the person applying for the permit of the approval or rejection of the application in writing. Upon the approval of the application and upon the payment of the prescribed fees, the director shall issue a permit for the construction, installation or alteration of such process, fuel-burning, refuse-burning, or control equipment. The director may issue conditional permits.

Section 4.5

Permit Violations - Violation of the installation permit shall be sufficient cause for the director to stop all work, and he is hereby authorized to seal the installation. No further work shall be done until the director is assured that the condition in question will be corrected and that the work will proceed in accordance with the installation permit.

Section 4.6

Time Limit on Permits - The director may cancel a permit if the installation or alteration is not begun within one year from the date of issuance of the permit or if the work involved in the installation or alteration is suspended for one year or more from the date of issuance of the permit.

Section 4.7

Exemptions from the Permit System - The provisions of this permit system shall not apply to:

(a) Maintenance structural changes or minor repair which does not change the capacity of such process, fuel-burning, refuse-burning, or control equipment and which does not involve any change in the quality, anture, or quantity of emission of air contaminants therefrom.

(b) Equipment utilized for all modes of transportation.

(c) Fuel burning and cooking equipment utilized in connection with any structures designed and used exclusively for not more than two families.

(d) Internal combustion engines.

(e) Laboratory equipment used exclusively for chemical or physical analysis or experimentation.

(f) Equipment for inspection of metal products.

(g) Portable brazing, soldering, or welding equipment.

(h) All gas fuel and No. 1 and No. 2 fuel-oil-burning equipment used for space heating, service water heating, and electric power generation.

(i) The following equipment:

1. Comfort air conditioning or comfort ventilating systems which are not designed to remove air contaminants generated by or released from specific units of equipment.
2. Cold storage refrigeration equipment.
3. Vacuum pumps in laboratory or pilot plant operations.
4. Water cooling towers and water cooling ponds not used for evaporative cooling of process water or not used for evaporative cooling of water from barometric jets or from barometric condensers.
5. Equipment used for partable steam cleaning.
6. Grain, metal, or mineral extrusion presses.
7. Porcelain enameling furnaces or procelain enameling drying ovens.

8. Unheated solvent dispension containers or unheated solvent rinsing containers of 60 gallons capacity or less.

9. Equipment used for hydraulic or hydrostatic testing.

10. Blacksmith forges.

(j) The following equipment or any exhaust system or collector serving exclusively such equipment:

1. Blast cleaning equipment using a suspension of abrasive in water.

2. Bakery ovens where the products are edible and intended for human consumption.

3. Kilns for firing ceramic ware, heated exclusively by natural gas or liquefied petroleum gas, any combinations thereof or heated electrically.

4. Confection cookers where the products are edible and intended for human consumption.

5. Drop hammers or hydraulic presses for forging or metal working.

6. Die casting machines.

7. Atmosphere generators used in connection with metal heat treating processes.

8. Photographic process equipment by which an image is reproduced upon material sensitized to radiant energy.

9. Equipment used exclusively for the sintering of glass or metals, but not excepting equipment used for sintering metal bearing ores, metal scale, clay, fly ash, or metal compounds.

10. Equipment for carving, cutting, routing, turning, drilling, machining, sawing, surface grinding, sanding, buffing or polishing of ceramic artwork, leather, metals, plastics or rubber.

11. Equipment for drilling, carving, cutting, routing, turning, sawing, planing, spindle sanding or disc sanding of wood or wood products.

12. Equipment for surface preparation of metals by use of

aqueous solutions, except for acid solutions.

13. Equipment used for washing or drying products fabricated from metal or glass, provided that no volatile organic materials are used in the process and that no oil or solid fuel is burned.

14. Laundry dryers, extractors or tumblers for fabrics cleaned with only water solutions or bleach or detergents.

15. Containers, reservoirs, or tanks used exclusively for electrolytic plating with, or electrolytic polishing of, or electrolytic stripping of the following metals: Brass, Bronze, Cadmium, Copper, Iron, Lead, Nickel, Tin, Zinc, Precious Metals.

(k) Natural draft hoods or natural draft ventilators.

(l) Containers, reservoirs or tanks used exclusively for:

1. Dipping operations for coating objects with oils, waxes, or greases.

2. Dipping operations for applying coating of natural or synthetic resins which contain no organic solvents.

3. Storage of butane, propane or liquefied petroleum gas.

4. Storage of lubricating oils.

(m) Natural gas-fired or liquefied petroleum gas-fired or electrically-heated furnaces for heat treating glass or metals, the use of which does not involve molten materials.

(n) Crucible furnaces, pot furnaces or induction furnaces, with a capacity of 1,000 pounds or less each, in which no sweating or distilling is conducted, nor any fluxing conducted utilizing free chlorine, chloride and fluoride derivatives and ammonium compounds, and from which only the following metals are poured or in which only the following metals are held in a molten state:

1. Aluminum or any alloy containing over 50 percent aluminum.

2. Magnesium or any alloy containing over 50 percent magnesium.

3. Lead or any alloy containing over 50 percent lead.

4. Tin or any alloy containing over 50 percent tin.

5. Zinc or any alloy containing over 50 percent zinc.

6. Copper.

(o) Vacuum cleaning systems used exclusively for industrial, commercial or residential housekeeping purposes.

Section 4.8

Operation of Processes and Equipment - No person shall operate or cause to be operated any new or altered process, fuel-burning, refuse-burning, or control equipment or any equipment pertaining thereto for which an installation permit was required or was issued until an inspection has been made by the director. The person responsible for the installation construction, or alteration of any process, fuel-burning, refuse-burning, or control equipment for which an installation permit is required, shall notify the director when the work is completed and ready for final inspection, which inspection shall be made promptly after such notification.

No equipment shall be operated for any other purpose or in any other manner than that for which the installation permit was approved and for which a certificate of operation has been issued unless otherwise authorized in writing by the department. Such equipment shall also be maintained in a state of good repair.

Section 4.9

Certificate of Operation - After the installation permit has been issued and it is demonstrated to the satisfaction of the director that the process, fuel-burning, refuse-burning, or control equipment can be operated in compliance with this regulation, an initial certificate of operation shall be issued by the director. Emission tests may be required by the director before the issuing of an initial certificate of operation as set forth in Section 8.1, if he has reason to believe that the emissions may exceed the standards established by this regulation. Said certificate of operation shall be kept posted on or near the installation for which it was issued. The certificate of operation shall properly identify the equipment to which it pertains and shall specify the class of fuel, type of refuse, type of raw materials used, if any, for which the equipment and appurtenances have been designed or which have been successfully used in the operating test. The initial certificate of operation shall remain in force until terminated by any one or more of the following actions:

(a) Implementation and instituion of Section 4.10.

(b) Execution of Section 11.1.

Failure to operate successfully under test within the limitations and requirements of this regulation shall constitute sufficient grounds for ordering changes in the process, fuel-burning, refuse-burning, or control equipment or appurtenances before an initial certificate of operation is issued. After ten (10) days written notice, the director is hereby authorized to seal any equipment for which a certificate of operation is required and has not been issued, except an immediate sealing of equipment is authorized if there is a health or safety hazard.

Section 4.10

The director may require the periodic renewal of certificates of operation on those installations for which an installation permit was obtained, and may require the issuance or renewal of certificates of operation on similar equipment existing prior to the adoption of this regulation and collect appropriate fees thereof for such certificates. Such certificates of operation shall not be required more often than once per year, and may be terminated for the same reasons and in the same manner as listed in Section 4.9.

Section 4.11

Prosecution of Regulation Violations - The issuance by the director of any installation permit or certificate of operation shall not be held to exempt the person to whom the permit or certificates was issued or who is in possession of the same, from prosecution for the emission of air contaminants prohibited by this regulation.

Section 4.12

This article shall be come effective six months after the adoption of this regulation.

ARTICLE V

SCHEDULE OF FEES

Section 5.1

Fees for inspections, tests, examinations and the issuance of all licenses, installation permits and certificates of operation required by this regulation and for hearings before the Appeals Board shall be paid to the department, who shall be paid to the department, who shall give receipt therefor. The amount of such fees shall be established by the Board and shall be based upon a reasonable approximation of the cost of the supervision, inspections and the conducting of tests or examinations required by this regulation and necessary for the enforcement thereof, but in no case shall the installation permit fee or the hearing fee be more than one hundred dollars ($100), nor the fee for the certificate of operation, or licenses be more than seventy-five dollars ($75).

ARTICLE VI

EMISSION LIMITATIONS AND PROHIBITIONS STANDARDS OF MEASUREMENT

Section 6.1

Emission of Visible Air Contaminants - No person shall cause or permit a discharge into the atmosphere from any single source of emission whatsoever any visible air contaminant which is of a shade equal to or darker than number 1.5 on the Ringelmann Chart or of a density equal to or greater than 30% opacity.

Section 6.1A

Grading Visible Emissions - Observations shall be made by observers trained to evaluate visible emissions based upon the Ringelmann Chart and/or opacity measurements.

Section 6.1B

Exceptions -

(1) Emissions equal to 1.5 Ringelmann or 30% opacity for three minutes in any 30 minute period.

(2) Where the presence of uncombined water is the only reason for failure of an emission to meet the requirements.

(3) Any open fire ignited for the purpose of training firemen or for research in fire prevention, provided the division has issued a permit therefor.

Section 6.2 **Emission of Particulate Matter from any Source:** No person shall cause, suffer, or allow the emission into the atmosphere from any single source of emission whatsoever particulate matter in excess of the particulate matter Emission Schedule listed below:

PARTICULATE MATTER EMISSION SCHEDULE

SOURCE OF EMISSION	CAPACITY RATING	MAXIMUM ALLOWABLE EMISSION Pounds of Particulate/Thousand Pounds of Exhaust Gas (a), (d)
Fuel Burning *		
Pulverized Fuel Fired * * (including cyclone furnace)	0 to 300	0.30 to 0.20
	300 to 3,600	0.20 to 0.15
All Other Modes of Fuel Firing	0 to 100	0.65
	100 to 300	0.65 to 0.45 (b)
	300 to 800	0.45 to 0.30 (b)
	800 and over	0.30
Foundry Operations		
Production Cupola		0.10
Jobbing Cupola		0.40
Electric Furnace		0.10
Sand Handling		0.10
Steel Manufacturing		
Open Hearth Furnaces		0.10
Basic Oxygen Furnaces		0.10
Electric Furnaces		0.10
Sintering Plants		0.15
Blast Furnaces		0.15
Heating & Reheating Furnaces		0.30
Incinerators (c) * * *		
Residential Apartments	0 to 200	0.65
	200 and over	0.30
Commercial & Industrial	0 to 400	0.65
	400 and over	0.30
Municipal		0.20
Pathological		0.20
Sewage Sludge		0.20
Liquid Waste		0.10
Surface Finishing, Cleaning and Grinding Operations		0.10

PARTICULATE MATTER EMISSIONS SCHEDULE CONTINUED

Lime Kiln Stack Gases		
Rotary Kilns		0.20 and or 99 percent by weight collector efficiency whichever is more restrictive (e)
Other Kilns		0.20 (e)
Cement Manufacturing * * * *		
Kiln-wet or dry process		0.10
Clinker Cooler		0.30
Grinding, crushing and other material handling		0.10
Aggregate Sintering		0.15
Pelletizing		
Iron Ore - Grate Kiln & Traveling Grate* * * * *	100,000 or less	0.20
	300,000	0.15
	600,000	0.10
Other than Iron Ore		0.10
Chemical and Mineral Kilns		
Rotary& other kilns		0.20
Asphaltic Concrete Batching Plants		0.20

Sources Not Specifically Named

The maximum allowable emission of particulate matter from any source except those specified in the particulate matter emission schedule, shall be determined from the allowable rate of emission based on process weight rate schedule unless a specific emission level for the process is developed and listed by the Wayne County Board of Health on its own initiative or by application. All new listed values shall be based upon the control results achievable with the application of the best, technically feasible, practical equipment available.

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* Fuel burning capacity rating - thousands of pounds of steam per hour

* * No pulverized fuel fired equipment (including cyclone furnaces) shall be constructed or installed after March 31, 1972, without receiving a maximum allowable emission listing from the Wayne County Department of Health.

* * * Incinerator capacity rating - pounds per hour

* * * * Maximum allowable emissions is shown for capacity up to 15,000 barrels per day. It is required that a maximum allowable emission listing be applied for to the Wayne County Board of Health for all kiln installations which will result in a total plant kiln capacity in excess of 15,000 barrels of cement per day.

* * * * * Iron ore pelletizing capacity rating - standard cubic feet per minute of gas.

Lettered footnotes refer to Particulate Matter Emissions Schedule:

a. Fuel-burning and incinerator emission limitations shall be corrected to 150 percent total air.

b. Emission limitations for specific ratings are determined by linear interpolation between the ranges shown.

c. These emission limitations do not apply to domestic incinerators defined as having not over five cubic feet of charging capacity.

d. When wet collectors or scrubbers are utilized, that portion of water vapor in the exhaust gases which was added for collector or scrubber requirements shall be deleted from the total exhaust gases in calculating the particulate emission rate.

e. This emission rate shall be measured at actual stack exhaust gas conditions with no correction for excess air or moisture content, but in no case shall avoid intentions of Section 6.7.

PROCESS WEIGHT RATE		RATE OF EMISSION	PROCESS WEIGHT RATE		RATE OF EMISSION
LB/HR	TONS/HR	LB/HR	LB/HR	TONS/HR	LB/HR
100	0.05	0.55	16,000	8.00	16.5
200	0.10	0.88	18,000	9.00	17.9
400	0.20	1.40	20,000	10.	19.2
600	0.30	1.83	30,000	15.	25.2
800	0.40	2.22	40,000	20.	30.5
1,000	0.50	2.58	50,000	25.	35.4
1,500	0.75	3.38	60,000	30.	40.0
2,000	1.00	4.10	70,000	35.	41.3
2,500	1.25	4.76	80,000	40.	42.5
3,000	1.50	5.38	90,000	45.	43.6
3,500	1.75	5.95	100,000	50.	44.6
4,000	2.00	6.52	120,000	60.	46.3
5,000	2.50	7.58	140,000	70.	47.8
6,000	3.00	8.56	160,000	80.	49.0
7,000	3.50	9.49	200,000	100.	51.2
8,000	4.00	10.4	1,000,000	500.	69.0
9,000	4.50	11.2	2,000,000	1,000.	77.6
10,000	5.00	12.0	6,000,000	3,000.	92.7
12,000	6.00	13.6			

[a] Interpolation of the data in this table for process weight rates up to 60,000 lb/hr shall be accomplished by use of the equation $E = 4.10\ P^{0.67}$ and interpolation and extrapolation of the data for process weight rates in excess of 60,000 lb/hr shall be accomplished by use of the equation $E = 55.0\ P^{0.11} - 40$, where E = rate of emission in lb/hr and P = process weight in tons/hr.

Section 6.2A **Differentiation Between Jobbing and Production Foundries:** Cupolas used in a jobbing foundry are the same as those used in a production foundry and will vary in size only according to the quanitity of iron melted per hour.

However, the cupolas in a jobbing foundry will be run intermittently for just long enough at one time to pour the molds that are ready on the foundry floor, job by job. This might be for a two to four hour period per day for any number of days per week.

Whereas the production foundry cupolas will melt continuously to pour a succession of molds that are constantly being prepared to receive this continuous flow of iron. This could become eight hours, sixteen hours, or twenty-four hours per day for any number of days per week.

Section 6.2B **Collector Requirements for Production Cupolas:** The intent of the design emission limitation of 0.1 pounds/1000 pounds of gas applying to production ferrous foundry cupolas is to require the installation of high efficiency collectors capable of collecting the fine metallic fume typical of emissions from this source. Presently available equipment suitable for this application is a well-designed baghouse or a high pressure drop Venturi scrubber of equivalent efficiency. Other types of collectors will be considered on their individual merit and upon submission of adequate proof that they are capable of achieving equal efficiencies.

Section 6.2C **Collector Requirements for Jobbing Shop Cupolas:** This Section is for the purpose of clarifying the intent of the emission limitation of 0.4 pounds/1000 pounds of gas applying to jobbing shop cupolas. High efficiency cyclone type collectors or other types of collectors not less efficient are considered acceptable and capable of meeting this requirement.

Should the operation of this equipment, when properly applied, operated and maintained and served by an adequate stack, meet all Regulation requirements except the applicable emission limitation, this limitation is to be re-evaluated.

Section 6.2D **Collector Requirement for Single Retort Stoker-Fired Boilers:** New forced draft solid fuel fired boilers of less than 400 H.P. nominal rating and existing boilers in this category when stack or breeching is replaced shall be provided with a low draft loss collector or drop out box approved by the Director.

Explanation: While the proposed emission limitations of Section 6.2 would quite possibly make this requirement necessary it is felt that the above statement would simplify permit issuance and reduce the large amount of stack sampling that could be involved if emission limitations were the only requirement. It is intended to apply primarily to new single retort underfeed stoker fired plants and existing installations where practical.

Section 6.2E **Lime Kiln Stack Gases**: The intent of emission standard applying to lime kiln stack gases is to require the installation of high efficiency collectors capable of collecting the fine particulate typical of emissions from this source. Presently available equipment for this application is a well designed baghouse, electrostatic precipitator, or a wet scrubber of equivalent efficiency.

Section 6.2F **Stack Emission Test Method**: Stack emission tests for particulate matter shall be undertaken as near as practicable to the "A.S.M.E. Test Code for Dust Separating Apparatus, PTC 21-1941", the "A.S.M.E. Test Code for Determining Dust Concentrations is Gas Streams, PTC 27-1957," and the "Los Angeles County Source Testing Manual." These methods shall be used as a general guide, but may be modified or adjusted by the Director to suit specific sampling conditions or needs based upon good practice, judgment and experience.

Section 6.3 **Emission of Sulfur Compounds.**

Section 6.3A **Fuels and Emissions Relating to Power Generation, Steam Generation, Space Heating, and Service Water Heating.**

1. No person shall cause or permit to be burned fuel whose sulfur content exceeds the sulfur in fuel limitation schedule.

2. No person shall import, sell, purchase, exchange, deliver, store, transport, or offer for sale or exchange, fuel for burning in the County whose sulfur content exceeds the sulfur in fuel limitation schedule.

3. Any person who supplies fuels containing more than 0.5 percent sulfur by weight directly to a user for burning in the County shall keep records of the percent sulfur by weight contained in such fuel by date delivered, quantity, and to whom sold. Such records shall be available for review by the Division.

4. Sulfur in fuel limitation schedule:

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FUEL USE BY	FUEL TYPE	SULFUR IN FUEL, % BY WEIGHT				
		EFFECTIVE DATE				
		8/1/72	8/1/73	8/1/74	8/1/75	8/1/76
Electric Power Plant & Central Steam Generation Including Gov't. Plants	Pulverized Coal	2.50	2.00	1.50	1.25	1.00
	Other Coal	1.00	0.75	0.50	0.50	0.50
	Distillate Oil 1 & 2	0.30	0.30	0.30	0.30	0.30
	Crude & Heavy Oil #4, 5, 6	1.25	1.00	0.70	0.70	0.70
Residential & Comm'l Space & Water Htg.	Coal	0.75	0.50	0.50	0.30	0.30
	Distillate Oil &1 & 2	0.30	0.30	0.30	0.30	0.30
All Other uses Not Specified Above	Crude & Heavy Oil #4, 5, 6	1.25	1.00	0.70	0.70	0.70
	Coal	1.00	0.76	0.50	0.50	0.50
	Distillate Oil #1 & 2	0.30	0.30	0.30	0.30	0.30
	Crude & Heavy Oil #4, 5, 6	1.25	1.00	0.70	0.70	0.70

(5) No person shall cause or permit a discharge into the atmosphere from any single fuel burning source of emission whatsoever sulfur dioxide in excess of the sulfur dioxide concentration in exhaust gas schedule.

(6) Sulfur dioxide concentration in exhaust gas schedule:

FUEL USE BY	FUEL TYPE	SULFUR DIOXIDE IN EXHAUST GAS, PARTS PER MILLION BY VOLUME CORRECTED TO 50% EXCESS AIR				
		EFFECTIVE DATE				
		8/1/72	8/1/73	8/1/74	8/1/75	8/1/76
Electric Power Plant & Central Steam Generation Including Gov't. Plants	Pulverized Coal	1400	1100	825	700	550
	Other Coal	550	420	280	280	280
	Distillate Oil #1 & 2	120	120	120	120	120
	Crude & Heavy Oil #4, 5, 6	500	400	280	280	280
Residential & Comm'l. Space & Water Htg.	Coal	420	280	280	120	120
	Distillate Oil #1 & 2	120	120	120	120	120
	Crude & Heavy Oil #4, 5, 6	500	400	280	280	280
All Other Uses Not Specified Above	Coal	550	420	280	280	280
	Distillate Oil #1 & 2	120	120	120	120	120
	Crude & Heavy Oil #4, 5, 6	500	400	280	280	280

(7)

(a) No person shall cause or permit the burning of fuel in any fuel burning equipment having a higher average sulfur content than the fuel burned during the previous twelve (12) calendar months based on a comparable BTU content. For the purpose of determining compliance, the average sulfur content of all fuel and fuels used during each of the calendar months prior to August 1, 1971, shall be determined by averaging the sulfur content of all fuel used during each calendar month on the basis of pounds of sulfur per million BTU's heating value of the fuel or fuels, which shall not be exceeded in any calendar month from and after August 1, 1971, when compared with the same calendar month of the previous year, and determined upon the same averaging basis.

(b) The use of fuels having sulfur contents as set forth in the sulfur in fuel limitation schedule shall not allow degradation in the mass rate of particulate emission. The division may require source emission tests which may be performed by the division or under its supervision at the expense of the owners of such equipment and may require the submission of reports to the division both before and after changes are made in the sulfur content in fuel.

(8) No person who installs new fuel burning equipment after August 1, 1972 shall cause or permit the emission into the atmosphere sulfur dioxide exceeding the sulfur dioxide in exhaust gas schedule stipulated for August 1, 1976.

(9) If the measured sulfur dioxide air quality in the county meets the necessary Federal Ambient Air Quality Standard before implementation of any effective date in Section 6.3A (4) and 6.3A (6), the board may suspend implementation of any portion of said schedules in whole or in part upon reasonable evidence that failure to implement such supplementary provisions will not compromise achievement and/or maintenance of the secondary Federal Ambient Air Quality Standard.

Section 6.3B

Exceptions -

(1) The provisions of Section 6.3A (1) and 6.3A (7) (a) shall not apply to any person who has received an installation permit or certificate of operation from the division on a control device to desulfurize stack gases.

(2) The provisions of Section 6.3A (1) shall not apply to any person who uses a combination of fuels in such ratios as to meet the sulfur dioxide in exhaust gas schedule and such person shall procure written approval from the division for this exception.
The allowable emission will be based on the value in the schedule for the fuel having the higher allowable limit.

(3) The provisions of Section 6.3A (2) shall not apply to any person who imports, sells, purchases, delivers, stores, transports, or offers for sale or exchange fuel for burning in the county whose sulfur content exceeds the sulfur in fuel limitation schedule to another person who meets the requirements of Section 6.3B (1), 6.3B (2), or who has received a variance from the division.

Section 6.3C

Sulfuric Acid Plants -

(1) No person shall cause or permit sulfur dioxide tail gas emissions into the atmosphere from sulfuric acid manufacturing plants to exceed 6.5 pounds per ton of acid produced.

(2) No person shall cause or permit sulfuric acid, including sulfur trioxide, emissions into the atmosphere to exceed 0.70 pounds per ton of acid produced.

Section 6.3D

Sulfur Recovery Plants -

(1) No person shall cause or permit the emission into the atmosphere of sulfur dioxide, sulfur trioxide, or sulfuric acid from an existing sulfur recovery plant to exceed 0.02 pounds per pound of sulfur produced, or 0.01 pounds per pound of sulfur produced from a plant constructed after July 22, 1971.

Section 6.3E

Petroleum Refining Activities -

(1) No person shall cause or permit the combustion of any refinery process gas stream that contains hydrogen sulfide in concentration greater than 100 grains per hundred cubic feet of gas without removal of the hydrogen sulfide in excess of this concentration.

Section 6.3F

Hydrogen Sulfide -

(1) When the odor of hydrogen sulfide is found to exist beyond the property line of the source, measurements shall be taken by the method set forth in Section 6.3H(4) and if measured levels of hydrogen sulfide are found to be in excess of 0.005 parts per million by volume for a maximum period of two (2) consecutive minutes, the person causing or permitting such emissions into the atmosphere shall be deemed in violation of this section.

Section 6.3G

Sources Not Specifically Named -

(1) No person shall cause or permit the emission into the atmosphere from any single source gases containing more than 300 parts per million sulfur dioxide nor more than 15 milligrams per cubic meter of sulfuric acid or sulfur trioxide or a combination thereof: provided however that the foregoing limitations shall not apply to emissions in Section 6.3A through 6.3F

Section 6.3H

Methods of Measurement - Methods for sampling emissions covered in this article shall be as noted below. These methods shall be used as a general guide, but may be modified or adjusted by the director to suit specific sampling conditions or needs based upon good practice, judgment, and experience.

(1) Sulfur in fuel analysis:

(a) Coal: Sampling and analysis of coal ASTM D271

(b) Oil: Standard method of test for sulfur in petroleum oils ASTM D 1551.

(2) Sulfur dioxide in stack gas analysis:

Public Health Service Publication 999-AP-13(1965) Appendix B, p. 85-7.

(3) Sulfur trioxide in stack gas analysis:

Sulfuric acid in stack gas analysis:

Public Health Service Publication 999-AP-13(1965) Appendix B, p. 85-7.

(4) Hydrogen sulfide analysis:

Methylene Blue Method, Stern A. C., Ed. "Air Pollution", Vol. 11, Second Ed., 1968, p. 78-80. As researched by:

(a) M.S. Budd and H. A. Bewick, Anal. Chem. 24, 1536 (1952).

(b) M.B. Jacobs, M.M. Braverman and S. Hochheiser, Anal. Chem., 29, 1349 (1957)

Section 6.4

Open Burning -

(a) Open Burning Prohibited - No person shall ignite, cause or permit to be ignited, allow or maintain any open fire.

(b) Exceptions -

(1) Open fires for the cooking of food for human consumption on other than commercial premises providing, however, such open fires will be subject to Sections 6.1 and 6.5 hereof.

(2) Open fires ignited for the purose of training firemen or for research in fire prevention providing the division has issued a firemen training permit under terms and conditions acceptable to the division.

Section 6.5

General Prohibition -

(a) It shall be unlawful for any person to permit or cause the emission of such quantities of air contaminants from whatever source in such place or manner as to be detrimental to any person or to the public or to endanger the health, comfort, or safety of any person or the public, or in such manner as to cause injury or damage to property or business. Each day wherein a violation of this section occurs shall constitute a separate offense. Any act of emission of air contaminants from any single or multiple source in violation or excess of the limitations established in or pursuant to 6.1, 6.2, 6.3 and 6.4 of this regulation shall be unlawful, and may be ordered abated by the director. Such abatement may be in addition to the fines and penalties herein provided.

(b) Nothing in any section of this regulation relating to regulation of emission of air contaminants shall in any manner be construed as authorizing or legalizing the erection or maintenance of a nuisance.

Section 6.6

Wind-Borne Pollutants - It shall be unlawful for any person to operate or maintain, or cause to be operated or maintained, any premise, open area, right-of-way, storage pile of materials, or vehicle, or construction, alteration, demolition, or wrecking operation or any other enterprise that involves any handling, transporting, or disposition of any material or substance likely to be scattered by the wind, or susceptible to being wind-borne, without taking precautions or measures that will eliminate the escape of air contaminants. No person shall maintain or conduct, or cause to be maintained or conducted any parking lot, or automobile and/or truck sales lot, or cause or permit the use of any roadway under his control unless such lot or roadway is maintained in such manner as to eliminate the escape of air contaminants.

Section 6.7

Circumvention - Unless prior written approval is obtained from the director, no person shall build, erect, install or use any article, machine, equipment or other contrivance, the sole purpose of which is to dilute or conceal an emission without resulting in a reduction in the total release of air contaminants to the atmosphere. This section shall not apply for the control of odors, provided the limitations of Section 6.5 of this Article are met.

Section 6.8

Domestic Refuse Burning Equipment

(a) The Provisions of this section shall apply to:

(1) "Type A. Domestic incinerators for burning rubbish and garbage" and

(2) "Type B. Domestic incinerators for burning ordinary paper or similar material only".

Direct-fed incinerators having a furnace volume or charging capacity of not over five (5) cubic feet. Such domestic refuse burning equipment may be installed in other than single and two-family dwellings provided the refuse is of a character for which the incinerator is designed and is not excessive in amount. Excessive amounts shall be defined as a normal day's accumulation in excess of twice the rated capacity of the incinerator.

(b) It shall be unlawful for any person or their agents to import, sell, offer for sale, expose for sale, exchange, deliver, or install in the county:

(1) Any make or model of domestic refuse burning equipment which has not been approved by the department.

(2) Any make or model domestic refuse burning equipment for the burning of any type of refuse other than the types for which the refuse burning equipment has been approved by the department.

(3) Provided that the imporation, delivery or transportation of such domestic refuse burning equipment by railroad companies and other common carriers in the course of their common carrier business, shall not be deemed to be a violation of the provisions of this section.

(c) All domestic refuse burning equipment shall be submitted to the department for approval and be subjected to such tests as may be deemed necessary to establish the performance efficiency, durability minimum installation requirements, air pollution potential and fire hazard potential under ordinary operation. For fire hazard potential and efficiency determinations, nationally recognized standards such as those of the American Gas Association and the Underwriters Laboratories may be employed.

(1) Upon approval the department shall designate such domestic refuse burning equipment as being Type A or Type B.

(2) Any approved domestic refuse burning equipment that is imported, sold, offered for sale, exposed for sale, exchanged, delivered or installed for use in the county shall bear a plate or tag in accordance with the standards set therefor by the department which identifies the equipment as domestic refuse burning equipment and the type for which it is approved.

(3) Any person whose domestic refuse burning equipment is submitted to tests by the department must pay all expenses necessary to the attendant tests, and the department shall furnish the submitter a copy of the results of such tests.

(d) Domestic refuse burning equipment shall be installed only by persons licensed by the department after qualifying for registration, or by a licensed gas or oil contractor when registered as herein provided. Such licensee shall be responsible for determining that adequate safe draft exists for such equipment and have the duty and responsibility to see that adjustments of combustion controls on all gas or oil burners used in connection with space heating equipment shall be made by a licensed gas or oil contractor.

(e) Nothing herein contained shall prohibit a bona fide owner of a one-family dwelling which is, or will be on completion, the owner's place of residence, from personally installing therein domestic refuse burning equipment regulated hereunder, provided, that the said owner shall:

(1) Sign an affidavit on a form furnished by the department showing the applicant to be a bona fide owner and occupant, or will be the occupant on completion of the residence; and that the applicant will personally install the equipment therein for which the installation permit is requested.

(2) Pass an examination showing that the applicant is possessed of the necessary qualifications for installing such equipment in accordance with the applicable provisions thereof. Such examination may be oral or written and may include practical demonstrations.

(3) Apply for and secure the required installation permit.

(4) Obtain the required inspection within seventy-two (72) hours after the installation has been completed and the equipment placed in operation.

(f) All installer licenses shall expire on the 31st day of March of each current year and shall be renewable within sixty (60) days thereafter.

The license of any person required by this regulation may be suspended or revoked by the Director, after a hearing, for a good cause shown.

It shall be unlawful in the county for any person whose license has been suspended, revoked or not renewed to engage in the business of installing incinerators covered by this section, until such expired license has been renewed or such suspended or revoked license has been reinstated.

(g) Installation permits and certificates of operation shall be obtained in accordance with the requirements of Article IV, of these regulations. Periodic renewal of certificates of operation shall not be required for domestic refuse burning equipment installed in one or two-family dwellings.

(h) The director, with the approval of the Board, shall develop and publish rules or standards for the testing, design and installation requirements governing domestic refuse burning equipment.

(i) The director, with the approval of the Board, may suspend the applicability of this section as to specific cities, townships or villages on the request of the governing body or such city, township or village when he finds that compliance with local ordinances or regulations would effectuate substantial compliance with the requirements of this section. Whenever the Director so suspends the applicability of this section he will, whenever he deems it necessary to assure compliance with this section, reinstate it with full force and effect generally, or for the purposes of a specific application.

Section 6.9

If any single source of emission or combination of sources of emission be found to compromise the ambient air quality in the county, beyond the limitation set forth in any national primary and secondary ambient air quality standards now or hereafter established by the administrator of the environmental protection agency pursuant to the clean air act as amended December 31, 1970 (Public Law 91-640), not withstanding compliance with any maximum allowable emission rate allowed by this regulation, the director may require such further reduction in emissions from this or these sources as is necessary to obtain compliance with said national primary and secondary ambient air quality standards.

Section 6.10

Emission Recording Monitoring Devices - The director may require the owners of fuel burning, refuse burning or process equipment to install, maintain and use emission recording monitoring devices and to make periodic reports to the division on the nature and amount of such emissions and such reports shall become a public record. Failure to comply with the director's request shall be deemed to be a violation of this regulation.

Section 6.11

All sections and subsections of this article are independent and mutally exclusive of one another except where otherwise indicated, and in the case where there is conflict in interpretation, the more restrictive requirements will govern.

ARTICLE VII

PROCEDURAL REQUIREMENTS

Section 7.1

Violation Notice -

If the director has reason to believe an emission from any source does not meet the provisions of Article VI hereof, a violation notice may be issued to the owner or operator of the source in question.

Section 7.2

Violation Procedures -

(a) Any person who is issued a violation notice of Section 6.2 or 6.3 may, within thirty (30) days from the date of receipt of said notice submit data to the director indicating reasons why he does not believe he is in violation of these sections. The director shall review the data submitted and within fifteen (15) days affirm or withdraw the violation notice by informing, in writing, the person receiving said notice of the decision to affirm or withdraw. To the case where such data is not submitted to the director within the thirty (30) days stipulated, the violation shall be considered still in force and affirmed.

(b) In the case of a violation of Section 6.2 and/or Section 6.3, the person cited, within ten (10) days of receipt of the director's decision to affirm the violation notice as provided for in Section 7.2 (a), (or within ten (10) days of a decision of the Appeals Board, should appeal be taken from the director's decision to affirm the violation notice), may ask that emission tests be performed to determine the extent of emissions from the operation which is the subject of the emission violation notice. If the tests indicate that the emission exceeds the maximum allowable emission standard applicable to the provisions under Section 6.2 or 6.3, the violation notice shall be considered substantiated. If the tests indicate that the emission is equal to or less than the emission standard applicable to the provisions under Section 6.2 or 6.3, then the violation notice shall be considered void.

ARTICLE VIII

SAMPLING AND TESTING

Section 8.1

Authority to Conduct Tests -

(a) The director is hereby authorized to conduct, or cause to be conducted, any test or tests of any new or existing process, fuel-burning, refuse-burning, or control equipment the operation of which he has reason to believe may result in emissions in excess of the limitations in this regulation, or when he has reason to believe there is evidence that emission from any such equipment are exceeding any emission limitation prescribed in this regulation. A full written record of test conditions, of test methods, and of test results obtained by the director shall be maintained, kept on file, and made available for study by the owner. Upon notification by the director that emission tests are considered necessary, a person may elect to conduct such tests himself. In this event, the person shall notify the director of this decision and of the time and date of such testing. All tests so conducted shall be in a manner acceptable to the director and in conformity with Section 6.3, 6.2G and/or 6.3H, and a full written record of conditions in test, of test methods, and of test results obtained by the owner or his authorized test agents shall be maintained, kept on file, and made available for study by the director. The director may stipulate that a representative of his office be present during the conduct of such tests and may stipulate a reasonable time limit for the completion of such tests with consideration for seasonal adverse weather conditions.

(b) Nothing in this section concerning tests conducted by and paid for by any person or his authorized agent shall be deemed to abridge the rights of the director or his representatives to conduct separate or additional tests of any process, fuel-burning, refuse-burning, or control equipment on behalf of the county at a reasonable time and at the county's expense except as provided in Section 8.3 below.

(c) When an owner gives written notification to the director that secret and confidential processes are involved in the specific industrial operation in connection with which emission tests are to be made or are being made, the director shall treat and hold any and all information and data collected or made available regardless of its kind or character as secret and confidential, and it shall not be disclosed or made available in whole or in part at anytime without the written authority of the owner.

Section 8.2

Test Facilities and Access - It shall be the responsibility of the owner or operator of the operation tested to provide, at his expense, reasonable and necessary openings in the system or stack, and safe and easy access thereto, to permit technically valid samples and measurements to be taken. All new sources of air contaminants erected after the effective date of this regulation may be required by the director to provide adequate openings in the system or stack, and safe and easy access thereto, to permit technically valid measurements and samples to be taken. If a person refuses to supply test openings, access scaffolding, and other pertinent facilities requested for the purpose of conducting valid emission tests by the director, the director shall notify such person to show cause before the director on a day certain, not less than ten (10) nor more than twenty (20) days from the date of notice, why the equipment should not be sealed.

Section 8.3

Test Costs - If emission tests conducted as a result of procedures outlined in Section 7.2 (b) substantiate the violation notice, the person or persons liable for the violation shall be responsible for paying all attendant costs for conducting said tests. If said tests do not substantiate the violation notice, issued, then the county shall be responsible for paying all attendant costs for conducting said tests. This latter condition shall not obviate the owners' or operators' responsibilities set forth in Section 8.2. Provided, however, if the person liable elects to conduct his own stack emission tests as stipulated in Section 7.2 (b) and Section 8.1, the person so electing shall pay for these tests irrespective of their outcome. The data obtained during stack emission tests shall be made available to the director and the owner of the equipment being tested at their request.

To the contrary notwithstanding, emission tests performed on installations, where such tests are a condition of the installation permit, shall be at the expense of the owner regardless of the outcome of the tests.

Section 8.4

Authority to Obtain Samples - The director is hereby authorized to obtain any sample of fuels, refuse, or process materials for examination and analysis. A copy of the results of the analysis shall be made available to the owner upon his request. Failure of the owner to provide such sample upon request of the director shall be a violation of this regulation. Upon written request of the owner, any information relating to secret processes, methods of manufacture, products, or production ascertained or discovered by the director or the appeals board during the conduct of their work shall not be disclosed in whole or in part and shall be held confidential.

ARTICLE IX

VARIANCES

Section 9.1

Variance Clauses - Where emission sources in existence prior to adoption of this regulation do not meet the emission limitations noted in Section 6.2 and/or 6.3 above, then a program to meet the emission limitations stipulated in Section 6.2 and/or 6.3 shall be developed and offered to the director by the owner of the equipment causing the emission. This program shall be submitted upon the request of and within such times as shall be reasonable determined by the director, and after said program has been approved by the director, the owner of the equipment causing the emission shall not be in violation of

Section 6.2 and/or 6.3 of this regulation so long as said program is observed. In evaluating such a program of improvement, the director shall take into consideration the following factors:

(a) Action taken to control atmospheric pollution within emission limitations in effect prior to this regulation.

(b) Efficiency of any existing control equipment relative to that which would be required to meet emission limitations of this regulation.

(c) Temporary interim control measures intended to minimize existing pollution levels.

(d) The effect the source of emission has on air pollution generally or in the immediate vicinity of the source.

(e) The degree of control in relation to other similar facilities which produce air pollution.

(f) The age and prospective life of the facility in question.

Reports indicating the progress of these programs shall be submitted semi-annually to the director by the owner of the equipment causing the emission in question. If progress of the program is deemed by the director to be unsatisfactory, the director may suspend the program and issue a violation notice.

In the event the owner of the quipment causing the emission and the director cannot evolve a mutually acceptable program of improvement, the matter shall be referred to the Appeals Board for resolution and determination of an acceptable program, which shall be binding upon both the owner and the director. In making their determination, the Appeals Board shall also take into consideration the factors noted in (a) through (f) above.

ARTICLE X

APPEALS

Section 10.1

Appeals - Any person taking exception to any decision, ruling, regulation, violation notice, or order issued by the director may appeal to the

Appeals Board. Such appeal shall be taken within ten (10) days after the decision, ruling, regulation, violation notice, or order complained of, by filing with the director a notice of appeal directed to the Appeals Board specifying the grounds thereof and the relief sought. A filing fee of $25.00 shall be posted by the appellant at the time of filing of the appeal to cover the cost of the hearing. The director shall forthwith furnish to the Appeals Board all papers relating to the decision, ruling, regulation, or order which is appealed. The Appeals Board shall set a date not less than five days and not more than thirty (30) days after the date of filing of the appeal for the hearing and shall give notice thereof by registered mail to all interested parties. Such an appeal shall act as a stay of the decision, ruling, regulation, or order in question until the decision of the Appeals Board is rendered, except that this shall not be construed to abridge the rights of the director to summarily abate a health or safety hazard. The Appeals Board shall, within a period of thirty (30) days after the hearing, affirm, modify, or set aside in writing the decision, ruling, regulation, or order of the director.

The decision of the Appeals Board shall be final unless reversed by a court of competent jurisdiction. Appeals from the decision of the Appeals Board shall conform to the rules applicable to appeals from state administrative agencies.

ARTICLE XI

SEALING

Section 11.1

Sealing - After previous notification of three or more violations of this regulation within a twelve-month period, in respect to the emission of air contaminants, a violator may be notified by registered mail to show cause before the director within ten (10) days why the offending equipment shall not be sealed. The notice shall be directed to the last address of the person to be notified or if the person or his whereabouts is unknown, then the notice shall be posted on or near the premises at which the violations have occured. If upon the hearing, at which the violator or his agent or attorney may appear and be heard, the director finds that adequate corrective measures have not been taken, he shall seal the equipment until such time as corrective measures are taken. The decision may be appealed to the Appeals Board, and such appeal shall stay the sealing until the Appeals Board renders a decision. It shall be unlawful for any person to break a seal that has been duly affixed by the director or his authorized representative unless authorized in writing by the director to do so.

ARTICLE XII

REGISTRATION OF EMISSIONS

Section 12.1

When required - The director may require the written registration of points of emission of air contaminants, whether by stack, duct, flue, equipment or by any other means when such information is necessary for the conduct of the work of the department. A period of sixty (60) days shall be allowed for the filing of such registration. However, in cases of emergency, the director may designate any lesser time which he believes to be justified.

Section 12.2

Content of Registration - The written registration of points of emission may include the following information: the location of the source of emission, size of outlets, height of outlets, estimated rate and composition of emission, nature of the equipment creating the emissions, and any other pertinent information specified by the director.

Section 12.3

Use of Information - The information furnished in such registration shall not be used as evidence in any action brought for violation of this regulation.

Section 12.4

Failure to Provide Information - Any person who fails to register information as required by the director shall be considered in violation of this regulation.

ARTICLE XIII

RIGHT OF ENTRY

Section 13.1

Right of Entry for Inspection - Any person who in any manner, hinders, obstructs, delays, resists, prevents, or in any manner interferes or attempts to interfere with the director, or police officers in the performance of any duty enjoined, or shall refuse to permit the director or such officers to perform their duty by refusing them, or either of them, entrance at reasonable hours to any premises in which the provisions of this regulation are being violated or are suspected of being violated, or refuse to permit the inspection or examination of such premises for the purposes of the enforcement of this regulation, shall be subject to the fines and penalties hereinafter provided.

ARTICLE XIV

PENALTIES FOR VIOLATIONS

Section 14.1

Penalties - Any person or any person acting in behalf of said person in an employee, agency, or contractual relationship violating any of the provisions of this regulation shall upon conviction be subject to a fine or imprisonment or both as provided by law.

Section 14.2

Multiple Sources - The unlawful emission of air contaminants from each stack shall constitute a separate offense.

Section 14.3

Injunctive Proceedings - Whenever any person has been found to have repeatedly violated provisions of Article VI of this regulation, the director may upon written approval of the Board of Health commence appropriate civil legal action in a court of competent jurisdiction in the name of the county to enjoin and restrain further continuance of such violation.

ARTICLE XV

SEVERABILITY

Section 15.1

Severability - It is declared that this regulation is enacted in the interests of the public health and welfare of the residents of the county. If any part of this regulation shall be declared to be invalid or unconstitutional, such decision shall not affect the validity of the remaining portions of this regulation, the Board of Health hereby declaring that it would have passed such remaining portions of this regulation notwithstanding such invalidity.

ARTICLE XVI

PUBLIC HEARING

Section 16.1

Public Hearing - No rule of the Board shall be adopted, amended or repealed except after a public hearing held upon at least ten days' prior notice.

ARTICLE XVII

REPEAL CLAUSE

Section 17.1

Repeal Clause - All previous regulations or portions of regulations adopted by the Wayne County Board of Health that are inconsistent with or in conflict with this regulation are hereby repealed.

ARTICLE XVIII

SAVINGS CLAUSE

Section 18.1

Savings Clause - Any prosecution arising from a violation of the Wayne County Air Pollution Control Regulation of 1965 and as amended March 20, 1969, which prosecution may be pending at the time this amendment becomes effective, or any prosecution which may be started within one (1) year after the date of effect of this amendment in consequence of any violation of any regulation repealed or modified herein which violation was committed previous to the date of effect of this amendment, shall be tried and determined exactly as if such regulation had not been repealed or modified.

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